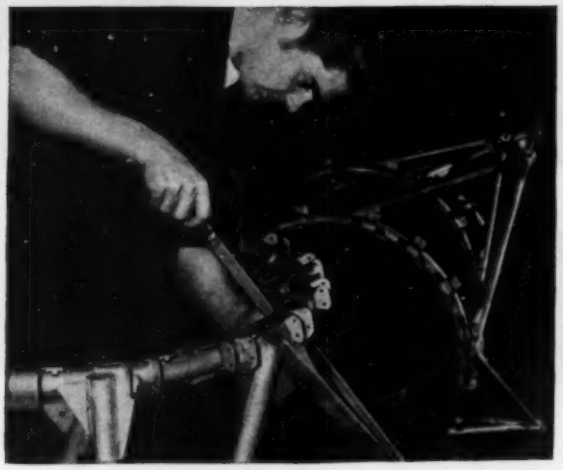
Industrial Arts and Vocational Education



(Above) B-47 jet bombers being assembled at the Boeing Airplane Company's Wichita plant.

(Right) A filing operation on an aluminum-alloy structural part for a Boeing plane (Seattle plant).

(Far Right) Nicholson Special Purpose Aluminum "A" File, designed for fast metal removal and yet leaving a good finish. Special tooth construction minimizes clogging . . . deep "open-throat" upcut for good bite, fine overcut for breaking up filings and overcoming "chatter."

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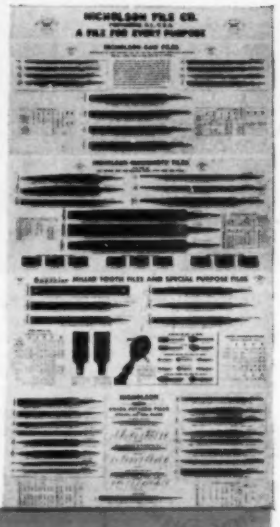

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Vol. 41 No. 9

NOVEMBER, 1952

INDUSTRIAL ARTS *and* VOCATIONAL EDUCATION

THE SHOP TEACHERS' PROFESSIONAL MAGAZINE

Published on the 15th of month preceding date of issue

THE BRUCE PUBLISHING COMPANY, 400 North Broadway, Milwaukee 1, Wis. • CENTRAL OFFICE: 20 North Wacker Drive, Chicago 6, Ill. • EASTERN OFFICE: 225 Broadway, New York 7, N. Y.

☆ ☆ ☆

This Month's Cover

The cover of the November, 1952, issue of INDUSTRIAL ARTS AND VOCATIONAL EDUCATION shows a student of the Milwaukee Vocational and Adult Schools getting his indoctrination as an electric welder. This subject is open to part-time, full-time, and evening school students.

The photograph was submitted by Stanley O. Opsahl, instructor of photography at that institution.

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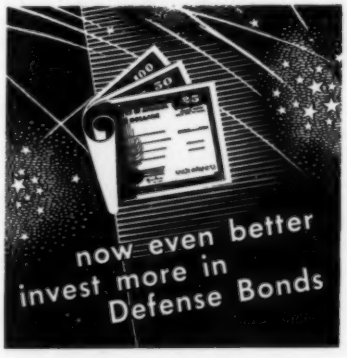

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Entered January 2, 1914, as Second-Class Mail Matter at Milwaukee, Wis., under Act of March 3, 1879. Copyright, 1952, by the Bruce Publishing Co. Title registered as Trade Mark in U. S. Patent Office, November 25, 1930. Published monthly except during July and August.

Subscription Information. — Subscription price in the United States, Canada, and countries of the Pan-American Union, $3.00 per year, payable in advance. Postage, foreign countries, 50 cents. Copies not over three months old, 35 cents; more than three months, 50 cents.

Discontinuance. — Notice of discontinuance of subscription must reach the Publication Office in Milwaukee, at least fifteen days before date of expiration. Notices of changes of address should invariably include the old as well as the new address. Complaints of nonreceipt of subscribers' copies cannot be honored unless made within fifteen days after date of issue.

Editorial Contributions. — The Editor invites contributions bearing upon Industrial Arts, Vocational Education, and related subjects. Manuscripts, drawings, projects, news, etc., should be sent to the Publication Office in Milwaukee. Contributions are paid for upon publication. In all cases manuscripts should be accompanied by full return postage.

Articles Indexed. — The articles contained in the Magazine are regularly indexed in "The Readers' Guide to Periodical Literature," and "Education Index."

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ASSOCIATION NEWS

COMING CONVENTIONS

Nov. 6–7. Kansas Industrial Education Association, at Topeka, Kans. Secretary: Donald W. Lake, Junior High School, Coffeyville, Kans.

Nov. 6–7. Kansas Vocational Association, at Topeka, Kans. Secretary: F. E. Carpenter, Highland Park Rural High School, Topeka, Kans.

Nov. 6–7. Missouri Vocational Association, at Kansas City, Mo. Secretary: H. H. London, University of Missouri, Columbia, Mo.

Nov. 6–8. Iowa Industrial Education Association, at Des Moines, Iowa. Secretary: Richard Allen, Woodside School, Des Moines, Iowa.

Nov. 6–8. Iowa Vocational Association, at Des Moines, Iowa. Secretary: Eleanore L. Kahlmann, Assistant Supervisor of Home Economics, State House, Des Moines, Iowa.

Nov. 7–8. New England Industrial Arts Teachers Association, at Eastland Hotel, Portland, Me.

Dec. 3–5. American Vocational Association, at Statler, Sheraton Plaza, and Bradford Hotels, Boston, Mass. Secretary: Dr. M. D. Mobley, 1010 Vermont Ave., N.W., Washington 5, D. C.

♦ The Wisconsin Industrial Arts Association will hold its annual meeting at Milwaukee on November 6 and 7, at which time the Wisconsin Education Association also holds its convention.

The Wisconsin Association of Vocational and Adult Education also holds a luncheon meeting on Thursday, November 6, at the same time.

♦ Officers elected for the year 1952–53 by the members of the Wisconsin Association for Vocational and Adult Education at their annual meeting in May, are:

President, H. J. Van Valkenburg, Fond du Lac; C. D. Rejahl re-elected secretary-treasurer; Grace Calkins, Eau Claire, vice-president for commercial subjects; Robert MacDonald, Sheboygan, for co-ordinators; Winifred Layden, Madison, for home economics and Josephine Kramer, Madison, for office workers.

♦ The Department of Industrial Education at the Pennsylvania State College, State College, Pa., held its Fifth Annual Conference on Industrial Education on Saturday, October 11, 1952, at State College, Pa.

The conference opened with a general session at 9:00 a.m., with an address by Charles T. Estes, special representative, Federal Mediation and Conciliation Service, Washington, D. C. Harold J. Peck was chairman of this meeting.

The Industrial Arts Sectional Meeting followed at 9:45 a.m., with a panel discussion on the topic — "Building Good Public Relations for the Industrial Arts Program." Ralph O. Gallington was chairman.

The Vocational Industrial Sectional Meeting at 9:45 a.m., was conducted under the Chairmanship of Ralph D. Widdowson. The panel discussion covered "Building Good Public Relations for the Vocational Industrial Program."

Another general session at 11:45 a.m. was held to summarize the sectional meetings. The chairman of this meeting was G. Lawrence Brown.

A luncheon followed at 12:30 p.m., at the Banquet Room, State College Hotel. Jesse F. Rees was chairman at the luncheon. — *S. Lewis Land.*

MILWAUKEE INDUSTRIAL ARTS TEACHERS' SHOP TOUR

More than fifty members of the Milwaukee Industrial Arts Teachers' Association visited the Yates-American Machine Company of Beloit, Wis.,

(Continued on page 6A)

Milwaukee industrial-arts teachers' shop tour

A HANDY, ECONOMICAL WAY TO BUY

Starrett TOOLS

Carefully selected on the basis of long experience with vocational education needs, these Starrett sets contain all the measuring tools needed for most shop projects. Compact, convenient, these kits are better for you, better for your boys. They are easier to store and issue, protect the tools, help prevent loss or damage . . . and right from the start they teach habits of care and neatness in handling fine tools. See them at your Starrett Tool distributor's . . . or write for Educational Folder No. 1202-CE.

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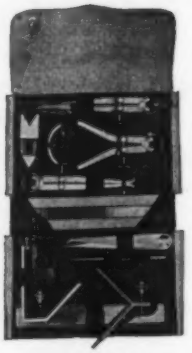
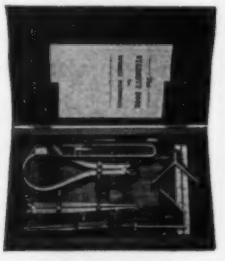
A more complete set for students and apprentices. Contains a 1" micrometer. 12" combination square with center head, center gage, center punch, 6" flexible steel rule in case, 4" divider, 4" inside caliper, 4" outside caliper and 4" hermaphrodite caliper. Simulated leather folding case.



SET NO. 900

The basic tools at minimum cost. Contains 6" combination square complete, 6" flexible steel rule, center gage, center punch, 4" divider, 4" inside caliper, 4" outside caliper and 4" hermaphrodite caliper. Simulated leather folding case.



SET NO. 901

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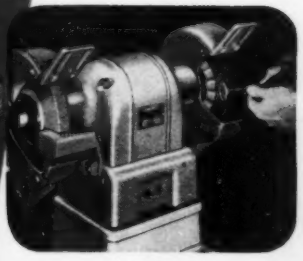
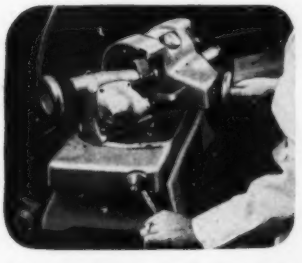


3 For bright, clean valve head, face and stem surfaces, remove carbon with B&D Bench Grinder and "Whirlwind" wire wheel brush. Insures tighter fits.

1 Teach students to use B&D ¼" Drills and small wire brushes to remove carbon from block, pistons, cylinder walls, valve parts, etc. Perfect accuracy every time!



4 Even beginners grind absolutely smooth surfaces and factory-accurate angles on valve faces with the B&D Deluxe Super-Service Valve Refacer.

2 Show students use of B&D ¼" Drills and valve guide cleaner in removing *all* carbon from valve guides. Thorough carbon removal prevents inaccurate work.

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BD Black & Decker PORTABLE ELECTRIC TOOLS

ASSOCIATION NEWS

(Continued from page 4A)

on their annual tour through Wisconsin industrial plants. John Flynn, vice-president and sales manager of the company, supervised their trip through the plant. The tour included inspection of all production departments and processes — patternmaking, molding, machining, assembly, testing, and shipping.

The Yates Company, originally a manufacturer of woodworking machinery exclusively, now has two other main divisions: Heat Transfer Products and Refrigeration.

Of particular interest to the industrial arts group was the Yates-American J-Line Machinery — a line of woodworking machines designed for use in school shops as well as for production work. Several of the J-Line machines were shown in operation and their outstanding features were explained.

On completion of their visit to the Beloit plant, the group lunched as guests of Yates-American, and then left for Janesville and a trip through the Chevrolet plant there.

INTER-AMERICAN SEMINAR ON VOCATIONAL EDUCATION

Vocational educators from twenty-seven nations conducted a seminar on the University of Maryland campus from August 2 through September 6. The participants studied the man-power situation in the Americas from the point of view of the problems of vocational education of less than college level and pre-university technical education.

Five working groups constituted the operational basis of the seminar. Group I concentrated on the general problems of an economic, social, and administrative nature that influence and are influenced by vocational education. Group II confined itself to agriculture, Group III to trades and industries, Group IV to business, and Group V to home and family living.

Official delegates and observers came from nineteen of the twenty-one member nations of the Organization of American States, including: Bolivia, Brazil, Chile, Colombia, Costa Rica, Cuba, Dominican Republic, Ecuador, Guatemala, Haiti, Honduras, Mexico, Nicaragua, Panama, Paraguay, Peru, United States, Uruguay, and Venezuela. There also were participants from Belgium, Burma, England, Iraq, Liberia, the Philippines, Switzerland, and Thailand.

The United States delegates were: Dr. R. W. Gregory, Chief Delegate; Miss Ata Lee; Dr. Druzilla Kent; A. F. Hamilton; F. B. Kyker; and Nicholas Mendez.

An executive committee was the governing body. It consisted of Dr. Guillermo Nannetti representing the Organization of the American States; Dr. Louis Q. Moss, the International Labor Organization; Dr. Willfred Mauck, the Institute of Inter-American Affairs; James Coxen, the U. S. Office of Education; and Dr. R. Lee Hornbake, the University of Maryland.

Dr. Fernando Romero, director of vocational education, Pan-American Union, directed the seminar.

The official languages of the seminar were English, French, Portuguese, and Spanish. Plenary sessions made use of simultaneous translation facilities.

IOWA INDUSTRIAL ARTS CONVENTION

The Iowa Industrial Arts Association Convention will be held November 6 and 7, 1952, at Hotel Fort Des Moines, Des Moines, Iowa.

The first session will be on Thursday, November 6 at 3:00 p.m. Kenneth Mueller will be the chairman.

Lt. L. S. Wright, USNR, will speak on the topic "The Navy Evaluates Industrial Arts Programs with Reference to Technical Needs."

The Epsilon Pi Tau Banquet will be held at 6:30 p.m., under the chairmanship of Dr. H. G. Palmer, in the Ranch Room.

At this banquet Dr. Walter Waitjen, Institute of Child Study, University of Maryland, will speak on "Peer Group Relationships Involving Industrial-Arts Activities."

Dr. Donald Scott, former technical director of education, Ecuador, will report on "Industrial Arts and the Point IV Latin American Mission."

On Friday, November 7, at 8:00 a.m., there will be a breakfast meeting at which Wilbur Hebbeln, chairman of life adjustment, Iowa Industrial Arts Association, Cedar Falls, Iowa, will preside. The topic will be "Industrial Arts Curriculum and Life Adjustment Problems."

Dr. Walter Waitjen will speak on "Industrial Arts and the Well-Adjusted Pupil."

Richard Allen, Des Mones, Iowa, will preside at the noon luncheon. A panel consisting of J. C. Wright, superintendent of schools, Keokuk, Iowa; Harvey Kluckholm, superintendent of schools, Le Mars, Iowa; and David Moorhead, supervisor at Boone County, Iowa; will discuss "Public Relations in Industrial Arts Programs."

(Continued on page 8A)

2 New Improvements
make your job easier

No. 14
Jack Plane — Exclusive 3-point bearing lever cap and precision fitted cutter cap prevent chatter. One-piece selected tool steel cutter iron. New shape handles for better control.

Your students can progress faster in "planing" because of 2 new improvements by Millers Falls. The wood parts now are fashioned from Goncalo—a beautifully grained, incredibly durable hardwood imported from tropical jungles—capable of withstanding a lifetime of hard shop use. Its very appearance makes it easier to develop in students a desire to feel, handle, use and care for the tool. And the new, scientifically contoured handle on bench models provides a roomier, surer grip than ever before; better control when working. It can't help but improve class results. See and try them yourself and you'll see why Millers Falls planes for years have been the choice of school shops everywhere.

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Big, fast, accurate, rugged — everything recommends this Atlas 10" floor saw for your shop. Tilt/arbor construction keeps table and work flat and safe at all times. 10" blade spins on two big, deep-grooved sealed-for-life ball bearings for long-lived accuracy. Controls are big, quick-acting, fine-setting, sure-locking. Exclusive Atlas rip fence extends the full length of the table, locks at *both* ends, yet releases instantly for lifting off or sliding to new position. Fence has vernier control for exact final setting. Table top is precision-ground grey-iron for smooth feeding of work, measures 20" x 27½" (39¾" x 27½" with one extension, 59½" x 27½" with two).

10" SAW NO. 3170

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20 PLAN PROJECT BOOK

This book will add new interest to any school shop program. Contains 20 step-by-step plans on authentic furniture projects—chairs, tables, wall shelf, corner bracket, window box, snack bar, knotty pine mirror, book ends, and many others — plus all popular types of joint construction, gluing, and finishing hints. 32 pages. Price $.50 postpaid, $.65 outside U.S.A. Order today.

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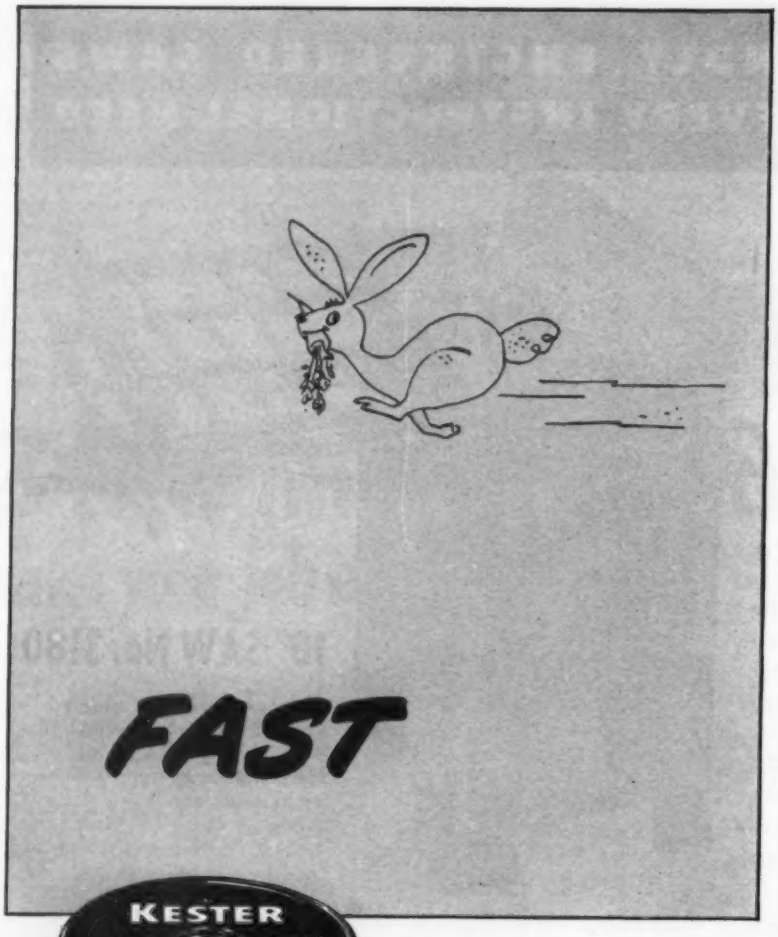

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ASSOCIATION NEWS

(Continued from page 6A)

Arnold Piersall, vice-president of I.I.A.A., will be the chairman at the 2:30 p.m. session. At this meeting addresses on "Issues and Trends in Industrial Arts Recorded in the National Education Association Writings," "Industrial Arts — A Phase of Guidance Programs," and "The Unique and Advantageous Position of Industrial Arts in the Socialization of Children" will be given. The speakers will be Prof. Walter E. Ditzler, Horace S. Oliver, and Dr. Walter Waitjen.

A business meeting will follow this meeting after which the Industrial Arts Mobile Unit and Industrial Arts Radio Communication in the Civil Defense Program will be discussed and demonstrated.

ANNUAL CONFERENCE OF TRAINING DIRECTORS

The Sixth Annual Conference of Training Directors was held October 9–10 at the New York State School of Industrial and Labor Relations at Cornell University. The theme of the conference was "Industrial Training in American Values."

Conference sessions discussed the stake industry has in training in those American values, which most concern industry, and past experience in this training area, together with ways in which such training might be made more effective.

ALLEGHENY COUNTY INDUSTRIAL ARTS TEACHERS' PROFESSIONAL ASSOCIATION

Things to happen in Pennsylvania:

1. This year will see the official birth of the Pennsylvania Industrial-Arts Association.
2. More county organizations will be formed.
3. A petition for a PSEA section goes up for final vote soon.
4. Allegheny County Association has plans for outstanding meetings each month.
5. Each year industrial-arts education is growing bigger and better.

Earl Kuhn is vice-president and program chairman of the association.

Personal News

JOHN A. BACKUS HONORED

In recognition of his contribution to the advancement of graphic-arts education in America, John A. Backus, manager of American Type Founders' Department of Education, was made an honorary member of Mu Sigma Pi. The fraternity key was presented to him by Dr. Fred Nicholson at the recent Michigan State Convention of Industrial Educators.

Membership in Mu Sigma Pi is limited to leaders in the field of industrial education. Other awards presented to the ATF Education Department head include: the Harry J. Friedman Memorial Medal in 1948; and a gold key bearing the emblem of Columbia University's Scholastic Press in 1949. In 1948 he was also made a member of Epsilon Pi Tau, an international honorary society of leaders in industrial art and education.

(Continued on page 18A)

Designed to meet school shop needs for a LIGHT-HEAVYWEIGHT Variable Speed Lathe

Another WALKER-TURNER *"first"*

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BOSTON — Dec. 1-5

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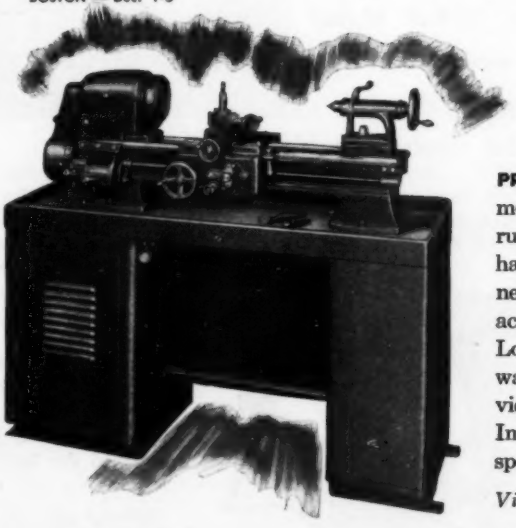

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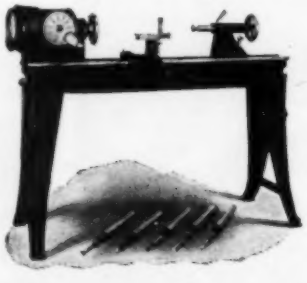

Write for Bulletin 159-M

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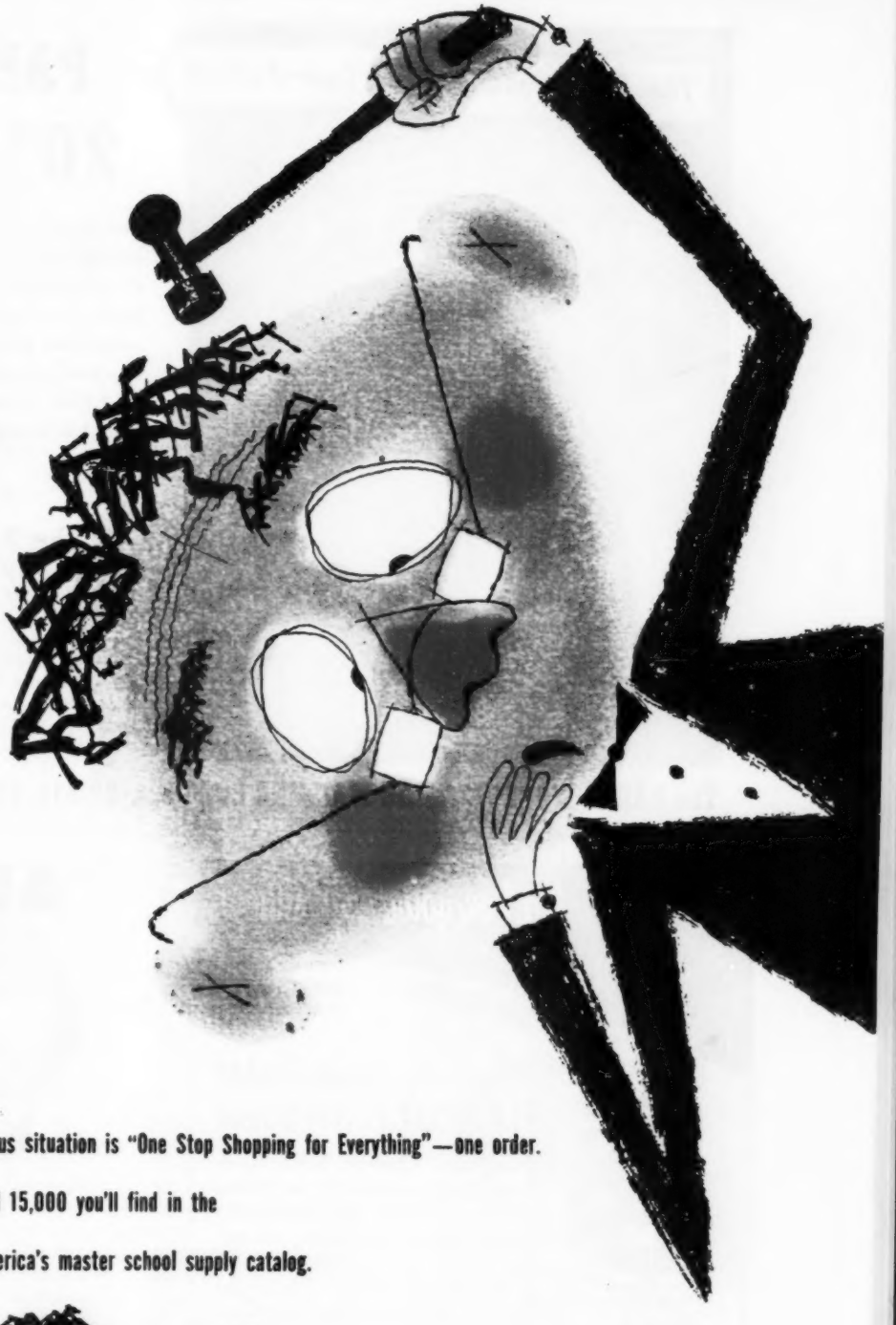

Well a hammer's the quick way for anyone beset with the problems of buying all the industrial training equipment, machinery and supplies modern schools need—however, a way that's just as deadly, but slower and more insidious, is the laborious and time-consuming method of dealing with scores of suppliers, seeing scads of salesmen, entangling yourself in the miles of red tape born of dozens of requisitions, approvals, etc., etc., etc. . . .

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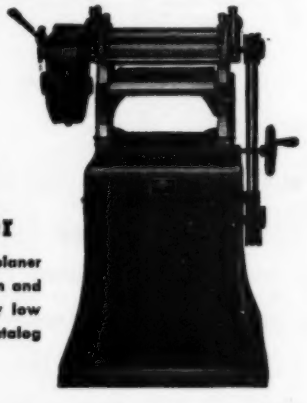

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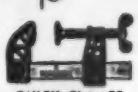

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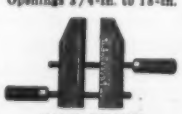

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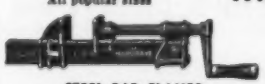

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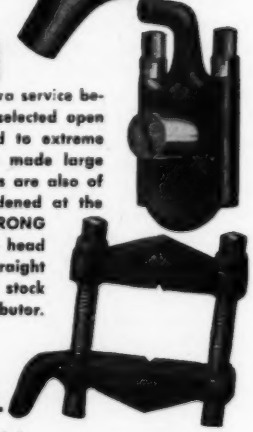

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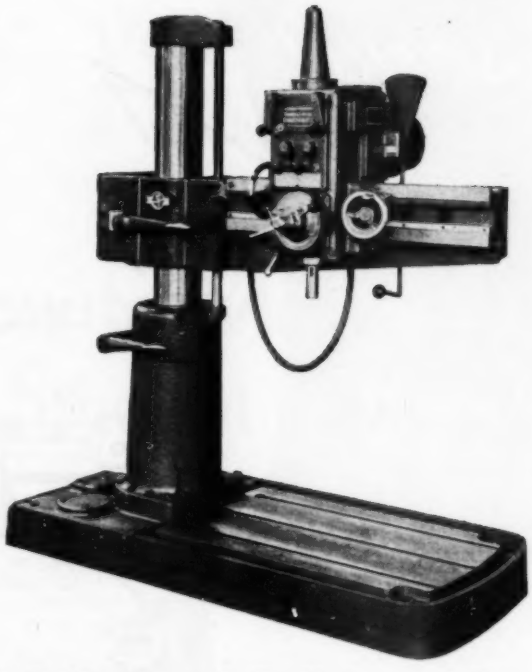

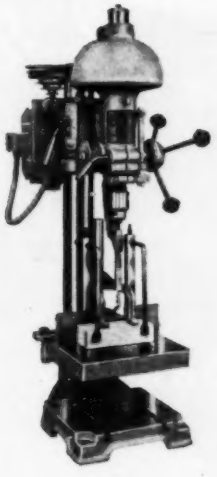

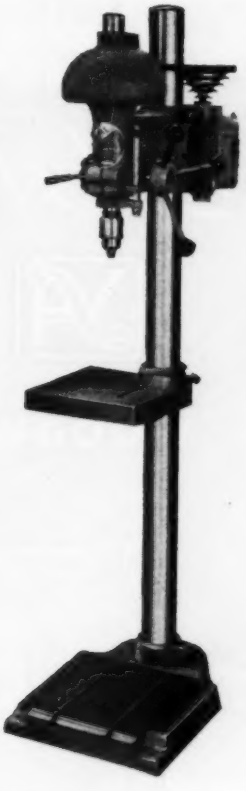

C-O Cincinnati Radials and Royal Drills widen the range of drilling instruction

New 3′ arm 7″ column medium-duty radial, widely used as a production tool in industry, is sufficiently low-priced to bring radial instruction to school and college shops. Drilling capacity up to 1″ in cast iron.

C-O CINCINNATI RADIAL—Here is a truly fine production tool designed to handle radial drilling up to 1″—a range which includes 90% of most industrial work. Low cost is combined with such high-priced radial features as: all geared head with 9 spindle speeds (30 to 1 overall ratio), 6 power feeds, flame hardened transmission gears, automatic pressure lubrication, all shafts mounted on anti-friction bearings, ground tubular steel column mounted on Timken tapered roller bearings, simple trouble-proof column and arm clamps, hardened and ground head rail on arm, heavy ribbed base with built-in coolant tank . . . Write for catalog D-121.

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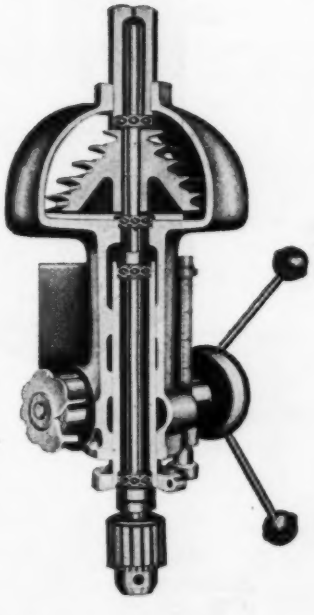
Write for catalogs D-118 and D-119.•



Royal spindle head construction features four sealed-for-life ball bearings, adjustable clock type spring spindle return, and adjustable depth gage.

CINCINNATI LATHE & TOOL CO.

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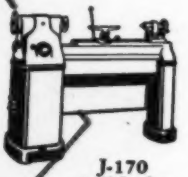

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J-131
8" Jointer

J-147
Combination Disc
& Belt Sander

J-145
Spindle Sander

J-150
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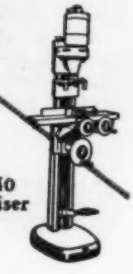

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J-LINE woodworking machines are man-sized . . . built rugged, to stand up under years of operation! Industrial Arts Departments acclaim these husky machines as stand-outs. They are modern in design, accurate, efficient, and easy to operate and maintain. Before you buy, be sure to look at J-LINE . . . the complete line, the quality line!

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INDUSTRIAL ARTS *and* VOCATIONAL EDUCATION

NOVEMBER 1952

How to Make Effective Use of Student Teachers

ARTHUR JOHNSON
Head, Industrial Arts Department
Central Junior High School
St. Cloud, Minn.

and

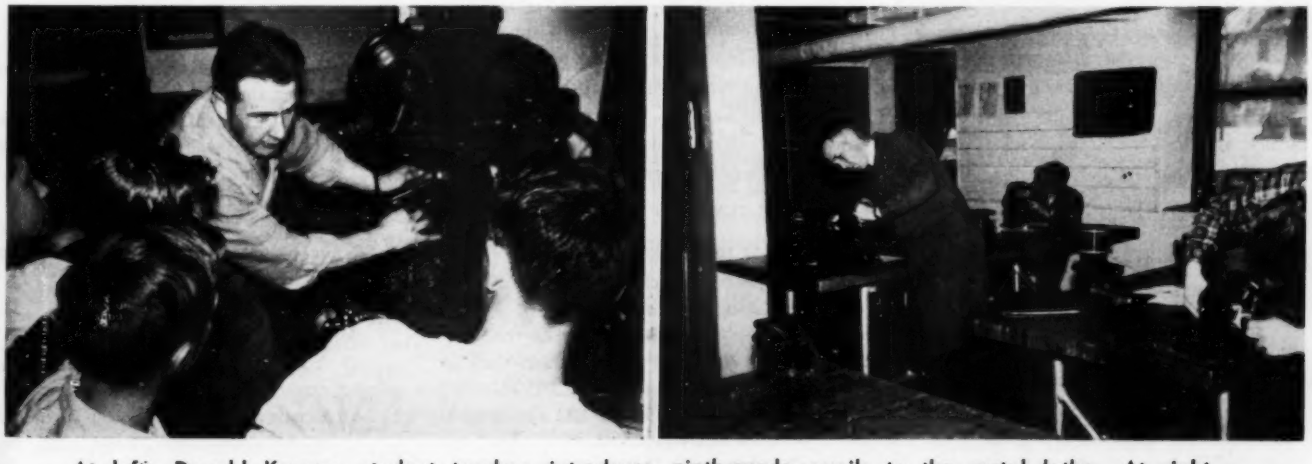
FRANK L. STEEVES
Supervisor of Student Teaching
State Teachers College
St. Cloud, Minn.

Just as long as student teachers are treated as liabilities, they will be liabilities. When they are treated as assets and are permitted to contribute the best that their training and individual abilities allow, they can improve the work being done in any classroom.

This is particularly true in the industrial arts. The variety of projects underway at any given time, the many hand and power tools in use, the size of the room or rooms, and the constant movement of pupils create an ideal situation for using student teachers both to help pupils and to relieve the pressure on the regular teacher.

A constructive program requires that the co-operating teacher and the college supervisor agree on a fundamental question. What is expected to be the major work of a student teacher in industrial arts? The present writers have agreed that the emphasis in the industrial arts must be shifted away from formal lesson planning and the preparation of "paper" objectives and observation reports toward active participation in the affairs of the class. The student teacher should be permitted to prove that he can do the work expected of him during his first year of regular teaching. He does this by doing the work, not by presenting plans on paper for the work. This in no way minimizes the importance of objectives and other paper work in connection with industrial-arts courses. It simply indicates that major practice in these activities should be given in curriculum and methods courses at a teacher-training institution.

This point of view does not imply that no plans should be written but rather that this type of activity should not monopolize the student teacher's time. Major presentations should be planned,



At left — Donald Kangas, student teacher, introduces ninth-grade pupils to the metal lathe. At right — Student teacher Russel Torfin is shown working on one of the required activities in an electricity unit

At left — Instructor Malcolm Doane is shown giving advice to student teachers. At right — Student teacher Roy Schnell makes minor adjustments to a grinder

and these plans should be detailed and complete descriptions of exactly what the student teacher plans to do and how he plans to do it. This is daily planning and is part of all good teaching. It is the *only* planning which a student teacher should be expected to do.

In any good situation the planning of the *courses* and the *objectives within the courses* where a student does his teaching already has been done. Part of the work of every competent regularly employed teacher is to plan the objectives of his courses and the activities by which pupils are expected to accomplish these objectives.

The student teacher should become familiar with these objectives and activities. He should understand the basic points of view of the courses in which he teaches. However, he cannot be expected to create new objectives, think through a philosophy, and devise a curriculum if at the same time he is experiencing his first attempts at guiding and directing the learning activities of pupils.

A beginning teacher's ability to guide and direct the learning activities of pupils is exactly what will make or break him during his first crucial year. Few are expected to plan new courses. Most new teachers are expected to work into an established and accepted program. Success during the first year is the result of being able to do the work in that program, to direct pupil activity, and to get along with others.

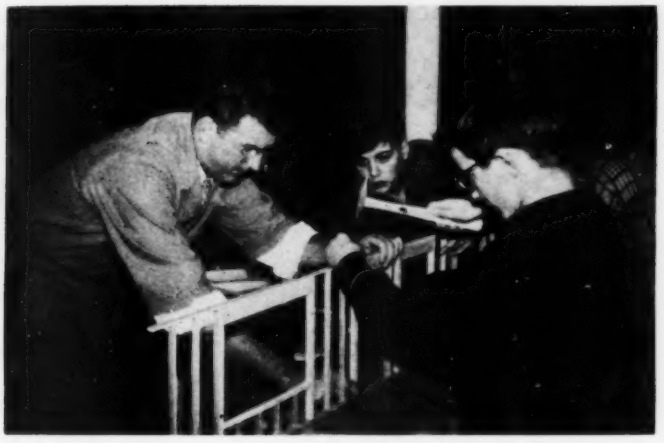
Failure to acknowledge this fact is the basis of much disagreement between college supervisors and the co-operating teachers who work with student teachers. Disgruntled student teachers, forced to choose between writing lesson plans, simulating objectives, and writing observations or doing the classroom work which is expected by the co-operating teacher, frequently defer in favor of the college supervisor — if only because he holds the final decision on the mark to be received. The result is an unsatisfactory teaching experience, unsatisfactory to the student, to the co-operating teacher, and to the pupils, all of whom might have been helped by intelligent participation in class activity by the student teacher.

Agreement to this point of view has provided the basis on which student teachers have proved themselves capable of doing exceedingly helpful work under the supervision of the writers. The types of wo done by student teachers are categorized in the following list. It should be understood that few students are strong in all of these activities. On the other hand, no student teacher has been found who has not been able to keep busy, help co-operating teachers, and learn within these categories.

1. Care of routine
   - *a*) Opening and closing class.
   - *b*) Taking attendance.
   - *c*) Keeping a watchful eye on mechanical conditions of the room such as light, temperature, ventilation.
   - *d*) Caring for, issuing, and checking in tools and equipment.
   - *e*) Other items that may come up.
2. Supervised study and individual tutoring
   - *a*) Helping small groups of pupils solve particular problems that trouble them.
   - *b*) Purposefully giving directions and explanations to individual pupils in need of help.
   - *c*) Handling tools and machines, the use of which is denied pupils.
   - *d*) Briefing pupils for field trips. In addition to briefing pupils the student teacher should make contact with proper authorities of the industry to be visited. This is a valuable experience for the student and in most instances contributes greatly to his confidence.
   - *e*) Other duties.
3. Demonstrations

   Several times during the teaching period each student teacher is expected to conduct demonstrations. These require paper plans to the extent that the student teacher needs to follow such a plan in order to conduct his demonstration smoothly and intelligently.
4. Preparation of teaching aids
   - *a*) Preparing the finished product for demonstration purposes.
   - *b*) Planning and caring for bulletin boards.
   - *c*) Obtaining teaching aids available in the school or college libraries and bringing them into the classroom. At least one teaching aid is expected to be original with the student teacher per teaching period.
   - *d*) Other aids.
5. Assisting in shop maintenance
   - *a*) Assisting in the preparation of home-made equipment.
   - *b*) Repairing, cleaning, or painting broken or discolored doors, walls, tools, etc.
   - *c*) Learning to assemble machinery, to fix broken parts, to make new parts.
   - *d*) Other similar duties.

Student-teacher Kermit Winslow briefs his students before they start on a new project



Student-teacher Joseph O'Donnell is shown assisting in the supervision of a shop class

The work of student teachers is evaluated and directed by means of several types of conferences.

1. Daily individual conferences between the student teacher and his co-operating teacher.

   The topics of this conference are very specific and are related directly to that which he has been doing immediately preceding the conference or to what he plans to do during the ensuing period.
2. Frequent individual or group conferences between student teachers and their co-operating teacher.

   The frequent, perhaps weekly, conference between one or more student teachers and a co-operating teacher is concerned with matters not directly related to specific, daily planning but rather with information necessary for a proper understanding of the course as a whole. Such matters as the relation of a particular industrial-arts or vocational course to the curriculum, the objectives of the course or of particular units, the trends in industrial-arts education, or even the sources, prices, and values of equipment the student teacher might be called upon to purchase at a future date, may constitute the topics of this type of conference.
3. Individual conference with college supervisor following a supervisory visit.

   In this conference the topics discussed are the same as those between the co-operating teacher and the student teacher, with particular reference to strengths and weaknesses in teaching observed by the supervisor during his visit.
4. Weekly group conference with college supervisor held with all student teachers.

   In this conference the problems common to all student teachers in all subject areas are discussed. These would include such topics as classroom management and discipline, getting along with teachers, and conduct and dress in the school.

This program, it should be recognized, is flexible. The occasional student teacher who does not know his subject, for example, is not expected to conduct demonstrations in that subject. However, he is expected to learn the subject by doing all that pupils are expected to do in advance of the pupils. Also, the occasional student teacher who is timid about speaking before an assembled class hardly is expected to open and close the period. However, he is expected to work with pupils individually and in small groups until he improves to the extent that he can face the class. The occasional careless, untidy, or presumptuous student teacher is given the best advice of both co-operating teacher and college supervisor until he improves.

A few of the student teachers have proved themselves capable of preparing complete and detailed units not regularly a part of their courses. When the circumstances permit, such outstanding students are allowed to present and evaluate their units.

The total program, however, has been set up to *allow* for such students not to treat their performances as the norm expected of all. The program allows for individual differences among student teachers.

This program is not a set of printed rules to be followed without exception. Within the types of activities rather loosely outlined here we have found student teachers able and willing to perform valuable service both to themselves and to the school in which they work.

Although the U. S. has only 40 per cent as much land favorable to oil accumulation as Russia, American wells are producing six times as much oil as Russia. — *Petroleum Newsnotes*

Paint-testing board. Probably some inquisitive souls may be satisfied with this test. Photograph submitted by Stan Schirmacher, industrial arts instructor, High School, Cottonwood, Arizona

Characteristics of a Sound Evening Trade School Program

MURRAY C. GELMAN
New York City, N. Y.

The author was recently given the responsibility of conducting a survey of the public evening trade schools of a large Eastern city. In order to evaluate the existing program, he developed the "characteristics of a sound evening trade school program." The sources which were drawn upon included the literature of the field as well as interviews and discussions with educators, administrators, supervisors, teachers, students, and others interested in the field of evening trade education.

These characteristics might well serve as a yardstick to help evaluate programs existing in other communities.

Curriculum

1. The curriculum is planned on a long term basis by periodic surveys of occupational needs.
2. Teachers participate in the construction of the curriculum.
3. The curriculum reflects community needs and interests.
4. Industrial needs and standards are met.
5. Job objectives of students are considered.
6. The curriculum is comprehensive and provides for all levels of ability.

Courses of Study

1. Courses of study are organized and prepared to carry out the aims and objectives of the curriculum.
2. Courses of study have standards of achievement which are well defined and specifically stated in all trade subjects.
3. These standards of achievement are subject to continuous appraisal and revision.
4. Adequate efforts are made to adjust the instruction to current industrial practices.
5. Courses of study are presented in unit courses of instruction, each unit covering a given number of hours of instruction.
6. Unit courses are arranged in the most effective order of learning.

Occupational Aspects of the Program

1. The training in skills and their application in the occupation are well coordinated.
2. There are definite standards of achievement for occupational competence.
3. Standards are co-operatively established by teachers, administrators, and industry in terms of school achievement and occupational requirements.
4. The training program culminates in a testing program meeting employment standards.

Guidance

1. At the time of entrance, adequate counseling is available so that the student may be assigned to a class consistent with his needs and abilities.
2. Provision is made for students to change courses.
3. Student data and records are available for teachers' use. Significant information is brought to the attention of teachers concerned.
4. Student records and data are complete and up to date.
5. There are adequate guidance personnel and services available for students.
6. A functioning plan of work between public and private employment agencies and school authorities is developed.

Pupil Personnel

1. The evening trade school has its share of bright and slow students.
2. Students know the specific job requirements of the occupation for which they are being trained.
3. The student wants to have the instruction co-ordinated with his job or objective.
4. The student learns best when the skills or information he is taught have immediate occupational application.
5. The student is physically tired after a day's work.

Teacher Personnel

1. The teacher has mastery of the skill and knowledge of the occupation which he teaches.
2. The teacher has the ability to teach, to *put over* to others what he knows or can do.
3. The teacher has an interest in students as workmen.
4. The teacher has the ability to analyze his occupation and organize it for instructional purposes.
5. The teacher has ability to plan the instruction and carry out his plans.
6. The teacher has a sympathetic understanding of both the students' learning difficulties on the job and their learning difficulties in the school.
7. The teacher has at least the minimum of general education required to *put over* to others what he teaches.
8. The teacher has acceptable personality traits.
9. The teacher is vigorous and in good health.
10. The teacher has good standing as a workman and as a citizen.
11. The teacher is abreast of the latest techniques of teaching his trade.
12. The teacher is abreast of the latest developments in the trade which he teaches.
13. The teacher knows what his former students are doing and how they are getting along on the jobs they are holding.

Plant, Equipment and Supplies

1. There is adequate space in a suitable building for the program.

2. Adequate equipment is provided.
3. Equipment is kept in good repair.
4. Adequate supplies are provided.
5. Equipment and supplies are appropriate in terms of recency and quality.
6. Storage facilities for supplies and equipment are adequate.
7. Physical features such as lighting, heating, and ventilation are suitable.
8. Seating equipment for students is adequate.
9. Provision is made for students' coats and hats, lunch boxes, and other personal belongings.

Democracy in Education

1. There is teacher participation in the formulation of school philosophy and policies.
2. There is teacher participation in the evaluation of the school program.
3. Experiences of former students are considered in the preparation and revision of courses of study.
4. Teachers participate in the selection of texts and other instructional material.

Relations With Industry

1. There is co-operation with industry through advisory committees.
2. Co-operative participation of interested groups having training responsibilities is secured and maintained.
3. Specific needs of industry are determined.
4. The choice of equipment meets industrial needs.
5. Community resources are utilized.

Classroom and Shop Procedures and Techniques

1. The classroom or shop reflects industrial and efficient organization.
2. Instructional standards are based on prevailing industrial standards.
3. The methods of teaching are modern and efficient.
4. There is good teacher-student and student-student rapport.
5. Each individual student of the class is permitted to progress as rapidly as his ability permits.
6. Students participate in desirable class activities.
7. The teacher evidences a strong interest in students and their work.
8. There is provision for individual assistance for those students who need individual attention.
9. Student progress reports are kept and are up to date.
10. Suitable instructional aids and facilities are available and readily accessible.

Improvement of Instruction

1. Administrators and teachers co-operate to improve the teaching and learning process.
2. A continuous program of research is employed as a basis for improving methods and materials.
3. Teachers are kept informed of latest researches.
4. Provision is made for teacher participation in research.
5. There is interdepartmental co-operation.
6. There is interschool co-operation.
7. Adequate library facilities are available and readily accessible to students and teachers.

Teacher Training

1. There is a specific and distinctive program for pre-service training of prospective teachers.
2. The pre-service program is determined by local needs.
3. There is specific provision for the follow-up of new teachers by the agency or agencies responsible for their initial training, for the purpose of improving the teacher training.
4. There is specific provision for the in-service training of teachers.
5. Pre-service and in-service training programs are streamlined to the specific needs of evening trade school teachers.
6. Provision is made for pre-service and in-service training for co-ordinators and supervisors.

Administration

1. Provision is made to encourage and develop local leadership to insure proper development and co-ordination of trade and industrial education of all kinds and levels.
2. The program is effectively co-ordinated with state and federal educational agencies.
3. There is effective co-operation between officials.
4. Effective co-ordination and co-operation between schools exist.
5. There is effective co-operation with the adult education program of the community.
6. Adequate records and reports are kept.
7. Required clerical routines are reduced to a minimum.
8. The program is properly advertised.
9. Systematic research investigations are made and used as a basis for long term planning of the educational program.

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Forty Years of Vocational Education on the Pacific Coast

BERT LAWLER
San Mateo, Calif.

About 45 years ago, as one of the first teachers of manual training in Oregon, the author recalls how primitive our methods and equipment were compared with today. Even in high schools, practically no machines were in use, and in the grades the work generally followed the Swedish Sloyd system.

In Portland, Ore., where the work started along about 1902, the department was under the supervision of a Mr. Standley, a highly trained English craftsman. Mr. Standley put the work on a splendid basis, and his work drew wide attention. Mr. Standley was strong on exercises in

woodwork instead of the elaborate projects featured in some places at that time. Simon Benson, then the leading lumberman in Oregon, was very much interested in the work, and gave Mr. Standley every encouragement. Mr. Benson, who had come to Oregon a poor boy from Sweden, probably influenced by Standley's work, established the Benson Technical School at a cost of $250,000 — a big sum at the time for work of that kind.

The author recalls the first morning he showed up to teach manual training 40 years ago in an old dirty basement in an Oregon high school. Many of the boys were under the impression manual training was some sort of physical education and were somewhat surprised to find an assortment of carpenter tools in the room.

What a change is found in the schools of today, where high schools are equipped with machine shop and woodworking machines equal to those used in small manufacturing industrial plants.

The city of San Mateo, Calif., with a population of less than 30,000, has a splendid setup, with a well-equipped woodshop, a first-class machine shop and auto repair shop. Three full-time instructors take care of the work. Even in somewhat rural centers like Ukiah, and Pacific Grove, Calif., and Mollala and Pendleton, Ore., and Wenatche and Yakima, Wash., one finds well-equipped shops for a variety of handwork.

Trade schools have sprung up all over the coast; perhaps Los Angeles has some of the most outstanding. At some of these schools, boys and girls get the basic training in practically every trade known to modern industry. In seattle, Wash., the Broadway Edison Technical School provides training in from 25 to 30 crafts.

On a recent visit to San Jose Teachers College, the author noted a class of girls at woodwork, several at turning lathes being trained, he was told, as teachers of occupational therapy in hospitals, and the like.

The author has traveled almost 2000 miles, and from his general observation, industrial arts and vocational education has fully kept pace with the advancement in other lines of educational endeavor in the past 40 years.

Common Learnings and Doings in Different Fields of Education

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Minneapolis, Minn.

This discussion of *common learnings and common doings in vocational education, in industrial arts, and in general (academic) education* is based on separating out Karapetoff's "Concentric Circles Method" of teaching engineering, which is discussed later on in the article when the circles are together again by means of the *bridge* shown in Figure 3.

The large circle at *A* in Figure 1, represents *educational literacy* which is the product of the ever expanding curriculum of general education. The *Three R's* were enriched by the *Three W's* (Words, Work, and Worship), and later countless numbers of other subjects.

The small circle at *B* in Figure 1 represents *occupational competency* which is ever becoming more specialized and due to technological change, and the fact that the machine replaces man, may be considered as a decreasing area.

The circle at *C* in Figure 1, represents *vocational literacy*, an economic necessity, and is portrayed by the area between the preceding circles. It is the No-Man's Land between general education on the left and vocational education on the right. In the area represented by the circle at *B*, we may find *common learnings* and *common doings*, and these may well form a *bridge* between the two opposing groups. Figure 3 shows this *bridge* and how it may be supported by the *Three M's* (Mind, Muscle, and Material).

J. F. A. Swarts, Inspector of Schools, Department of Education, Cape Town, South Africa, recently told the author, "There is an age old, world wide controversy between general education and vocational education. The Commonwealth of South Africa is trying to solve this problem and I have been appointed chairman of a commission by the crown to work on this project. I have searched for the solution in Europe and now in the United States and Canada I am looking for help."

This same problem is confronting us in all fields of education in this country, but there are many indications that a middle of the road position is gradually being worked out to settle it. Originally the more radical stand taken by some of the pioneers in vocational education is gradually being replaced by a more moderate view. For example, in the beginning days of the Smith-Hughes era one of the fighters in vocational education used to tell us, "Industrial Arts got into the schools on the plea of its vocational values; then it disowned its parent, it claimed respectability and classed itself as general education." Another one of the outstanding old guard used to preach, "Vocational education must be kept separate from general education;

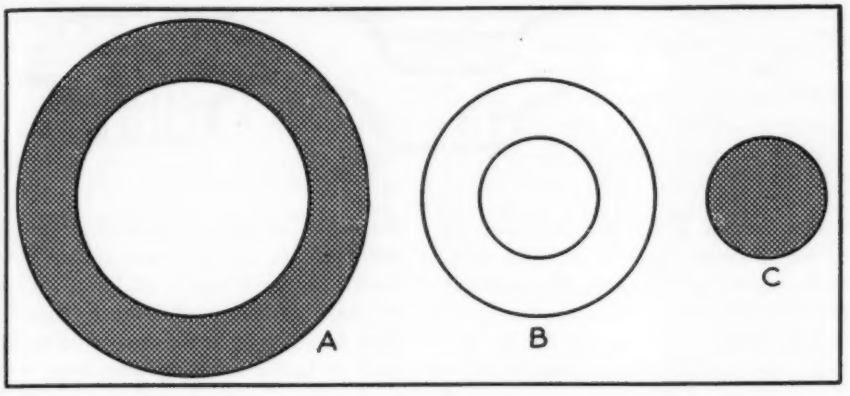

Fig. 1

if you try to mix them you are flirting with the scarlet woman."

Down through the many years the author has believed that in general it is better to look for similarities than to stress differences. From a wide experience in general education and vocational education both of college grade (engineering) and in less than college grade (trade school and vocational technical school), the author has found so much common ground that more attention might well be given to *common learnings and common doings*. With this approach on similarities we would then be placed in a better position to work out applications and implementations to the various fields.

In teacher training down through the many years I have been intrigued by finding so many common learnings and common doings, not only as between different trades and occupations but also as between different schools and different types. Not only did I find many such common areas between widely differing trades like machinists and hairdressers and farmers, but also many areas in industrial arts and vocational shops and out in the world of work. What common learnings and common doings could possibly exist between general (academic), industrial arts, and vocational shops? The answer came to the author from three sources:

1. Karapetoff, electrical engineer at Cornell back in the early nineteen hundreds.
2. Glenn Frank, former President of the University of Wisconsin, and
3. A definition of the "Golden Rule and Ten Commandments" of the working world by The American Society of Mechanical Engineers (A.S.M.E.).

1. Karapetoff stressed Concentric Methods of Teaching: Around every human activity in ever larger concentric circles should be given the directly related functioning knowledge applied to that activity. This is directly opposite to the everyday curriculum which schedules instruction material in separate circles not connected; in other words, in so-called watertight departments. Brought out in 1900, this probably was the father of the "core curriculum people."

2. Glenn Frank was asked why high school and college graduates seemed to find so little aid in school to enable them to more easily and rapidly secure adjustment out in life. He replied, "In high school and college all subjects are taught in watertight departments and little, if any, correlation is attempted; while out in life every problem confronting us calls for many different kinds of knowledge which must be applied to solve that specific problem." The separate circles versus the concentric circles idea.

3. The American Society of Mechanical Engineers (A.S.M.E.) helped us to bridge the gap between general education on the left bank of the river and vocational education on the right bank of the river by driving down three piles or piers: mind, muscle, and material. For many years the general educator had preached co-ordinating mind and muscle; and then the industrial-arts people emphasized the *muscle* part of it; then followed the vocational educator who stressed the *material* side of the problem.

When the A.S.M.E. stepped in, too many educators in all three fields (general academic teacher, industrial-arts and vocational instructors) either were ignorant of or disregarded the solution placed on their doorstep by the A.S.M.E. who said:

"Teachers, foremen, and supervisors control workers through the *Eight M's: machines, materials, muscles, methods, men, morale, money, and markets. Controlling workers* is *managing workers* and here is the definition of management:

"Management is the art and science of preparing, organizing, and directing human effort applied to control the force and utilize the materials of nature for the benefit of man: preparing, organizing, and directing human effort — controlling mind; applied to control the force — controlling muscle; utilize the materials of nature — controlling materials."

Hence from Karapetoff, from Glenn Frank, and from the A.S.M.E definition we find the first and outstanding *common learning* which will be seen to form a base for many other *common learnings* and common doings.

The work of the world is done by controlling the three M's: minds, muscles, and materials.

This leads directly to:

In the classroom and on the shop floor we control minds.

In the shop we control muscles and materials.

In *controlling minds* we must always answer the five questions:

1. *What* to do (he who can answer can get a job).
2. *How* to do it (he who can answer can hold the job).
3. *Why* do it (he who can answer may become the boss).
4. *When* to do it.
5. *Where* to do it (the boss must also answer questions 4 and 5).

The preceding discussion lays the foundation for: *Common learnings* in controlling the *mind* and *common doings* in controlling *muscles and materials*.

Common Learnings

I. The Seven Cardinal Principles
II. The Sixteen Abilities
III. The Nine Ingredients in All Payroll Jobs

Common Doings

IV. 99.47 per cent of all training jobs in school and work jobs out in the field of employment involve *five basic activities:*
   1. Processing materials
   2. Operating tools
      (Both processing and operating call for Numbers 3, 4, and 5.)
   3. Holding

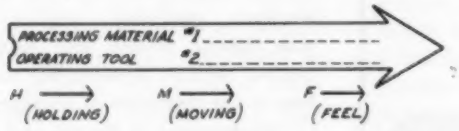

Fig. 2. Tool No. 1 from Craigo's kit

Figure 3

4. Moving
5. Feeling

And now for a brief discussion of the above four *learnings:*

I. *Seven Cardinal Principles:*

1. Health (including that important factor, safety)
2. Fundamental processes (readin', 'ritin', 'rithmetic, and plain thinking)
3. Family adjustment (this is adjustment to your group)
4. Vocational adjustment (this is adjustment to your payroll job)
5. Civic adjustment (this includes adjustment to your firm and city)
6. Leisure time
7. Ethical adjustment (this involves adjustment to society)

I have tried out this common learning on workers and learners and have been gratified how well it was received. *Try it!* It is basic to the four great adjustments in life: to your payroll job, to your group, to your firm, and to your life as a whole.

II. *The Sixteen Abilities:*

1. To read and follow written instructions
2. To understand and follow oral instructions
3. To write answers to questions
4. To use references
5. To use common hand tools, gauges, instruments, and the like
6. To learn to use machines
7. To plan work
8. To analyze problems
9. To avoid unnecessary activity
10. To measure accurately
11. To select proper tools for a job
12. To think in terms of spatial relations
13. To summarize results
14. To reason from results to cause and vice versa
15. To give reason for doing certain things
16. To work co-operatively with other people

How to Use These Sixteen Abilities

When a training or work job is completed, the *results* must be checked. If the results are not acceptable, the cause will be found among these 16 abilities, or directly connected therewith. For example: the *result* may be due to *cause,* No. 5 (lack of tool ability); or it may be due to No. 2 (not able to follow oral instructions); or it may be a combination of several. In such a case we should correct the ability before we say, "Buddy, it is wrong; do it over." The next step then becomes finding the *remedy.* In other words all activities call for these steps: (1) do it; (2) check to find result; (3) find cause; (4) find remedy. Then we should apply our efforts to the remedy so as to correct the cause.

III. *The Nine Ingredients in all payroll jobs*

1. Good pay
2. Good working conditions
3. Good bosses
4. Steady work
5. A chance to get ahead
6. To be treated with respect
7. To get the facts about what's going on
8. To be doing something worth while
9. Other reasons for really liking the job

How to Use These Nine Ingredients

L. S. Boulware, vice-president of the General Electric Company, in charge of personnel, solved the following three ever present problems:

1. How secure the three daily smiles: when you punch in, when you are at work, and when you punch out.

2. If you cannot get the job you like, how can you like the job you've got.

3. Maybe the home pasture is greener than in the other fields.

Both the employer and the employee have a direct responsibility in helping to build up all nine of these ingredients.

Check your own job; ask your group to rate these as applied to their own payroll jobs; ask them which of these nine is up to them and why; ask them if good pay is the main ingredient and if not, what should be first?

IV. *The Five Basic Activities in All Activities, or the Main Common Doing.*

The *common learnings* in *controlling minds* did not present much of a problem, but when the author began to ask, "Are there common doings in all lines?" it was realized that here trouble began. How can there be anything in common in doing jobs such as laying brick, splicing wire, writing a letter, dressing hair, plowing a field, sawing a board, or adjusting a bearing on an engine?

Applications of the *five activities* to some work jobs in different payroll jobs in widely differing occupations are listed below, and when tried out with many groups surprising results were attained. Since it is good business to have a bridge to retreat across when licked, I will state that in 99.47 per cent of all work jobs in all lines this will be found to be a *common doing.*

Operating steps in all work jobs in all lines call for the same five activities:

Processing	*Material*	*Tool*
For tailor: 1. Measuring	Bust, waist, hips Fill out on tool No. 2	tape measure
For carpenter: 2. Cutting up	lumber	saw
For printer: 3. Setting	type	printer's stick
For stenographer: 4. Writing	paper	typewriter
For electrician: 5. Splicing	wire	pliers
For welder: 6. Welding	pipe	torch
For beauty operator: 7. Set	hair	bobby pins

Figure 3, *A,* general (academic) education dwells on the left bank of the river and in general follows the objective of preservation of the past. It turns ever to the past for its source of knowledge which it passes down to future generations. Vocational education works on the right bank

and subscribes to the motto, *Preparation for the Future*.

Figure 3, *B* — The American Society of Mechanical Engineers (A.S.M.E.) gave us the formula which enabled us to drive down the three piers or piles: *mind, muscles, and materials*, a knowledge of which is essential on the right bank in doing the work of the world. While the general educator emphasizes training the mind on the left bank, and the vocational educator stresses muscles and materials on right bank, the industrial-arts instructor carries on his activities in all three fields.

Figure 3, *C*, shows *the bridge of common learnings and common doings*. It is built on the three piers or piles (mind, muscles, and materials) and rests on both approaches as do all good bridges.

* * *

Since all good bridges furnish facilities for two-way travel, there should no longer be any toll gates preventing unobstructed travel through life.

Leaders in Industrial Education

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(*Continued from page 261 of the October, 1952, issue*)

CHARLES ALLEN PROSSER (Continued)

Historic Deliberations

The first meeting of the conference was held on Staten Island in March, 1913. It was repeated in the spring of 1914, and again in 1915. Later in 1915, Dr. Prosser resigned his position as secretary of the National Society to become director of Dunwoody Institute, in Minneapolis, and the conferences were discontinued.

It would be difficult to exaggerate the importance of the work of this series of conferences. The conferences are of historic significance because they were held at a critical period of evolution of concepts of the place of vocational education in public education, and because the personnel of the conferences included the constructive framers of the basic structure of subsidized vocational education and the future administrators of the program on state and national levels.

These conferences deserve a place in the permanent record, also, because of the plan of organization and procedure of the conferences themselves.

1. The number of persons in attendance was small enough for genuine round-table discussion, and effective exchange of opinion based on experience.

2. The members of the conferences were, with a few exceptions, the officials from the participating states who were, or would be, charged with the responsibility of administering the legislation under discussion. Each man had a vital stake in the proceedings and in the outcomes. Each man had the strongest possible incentives for learning all he could from the experiences and the studies of the representatives of the other states; and, in turn, for contributing all he could from his own experience.

3. The conferences had the advantages of carefully planned and prepared programs, with assigned topics and leaders, and ample time allowed for discussion.

4. The topics arranged for discussion were of vital and immediate importance to the participants, and included: state legislation; problems of organization and administration; national legislation; terminology, standards, and procedures in the administration of state-aided vocational education.

Outcomes

The Staten Island Conferences were equally noteworthy because of the practical results obtained from intensive studies and exchange of experiences.

1. The discussions served to define and clarify the aims, problems, and practices of administration of vocational education.

2. The discussions helped to develop unanimity of opinion with respect to many hitherto controversial issues.

3. The discussions aided in establishing efficient methods and standards of procedure in the administration of vocational education in the several states.

4. The discussions aided in reaching general agreement on terminology and practices, which were made the basis of communication among the several states.

5. The conferences aided in developing a strong professional spirit, and fine fellowship, among the men engaged in the work.

With reference to the last point, it may be said that although these were strictly working conferences, and Dr. Prosser was something of a driver in his methods, there were opportunities for relaxation, and occasionally for merriment. The Goodhue Estate was situated in a relatively remote part of Staten Island (at that time), some distance from the nearest neighbors. Meetings began at the breakfast table, and ended some time in the late evening. When a break came in the late afternoon, there was little for the members to do except to take a brisk walk through the grounds, then dinner, and the resumption of the discussion.

The Richmond Survey

Another outstanding accomplishment of the National Society during this period was the industrial-education survey of Richmond, Va. The eighth annual convention of the Society was

scheduled to be held in Richmond in December, 1914. Dr. Prosser conceived the idea of conducting an industrial-education survey of the community in advance, submitting the findings and recommendations of the investigation to the leaders of the movement, and to general educators, who would be assembled at the convention, for critical study and discussion.

Preliminary conferences with Dr. J. A. C. Chandler, then superintendent of schools, members of the board of education, and representatives of business, industrial, and labor interests, showed that Richmond was ready and willing, and within a short time Prosser lined up a remarkable array of co-operating agencies. These included the Russell Sage Foundation, of New York City, which made available the services of Dr. Leonard P. Ayres, who was general director and co-ordinator of the survey; the U. S. Bureau of Labor Statistics, which furnished Charles H. Winslow, who served as director of the study of industrial plants; the U. S. Bureau of Education, which furnished a representative to assist in the study of the industries, and in the formulation of recommendations for the organization of schools and classes. The National Society appointed a general survey committee to direct the investigation, consisting of representatives of the Society, and of various labor, educational, commercial, and manufacturing organizations. In addition, a local survey committee supplied the guidance needed during the intervals between meetings of the general committee.

The school side of the survey sought information upon such questions as: (1) the amount and causes of attendance mortality; (2) the occupations which young people entered upon dropping out of school; (3) the existing opportunities for vocational training available in the public and private schools.

The industrial side of the survey sought information that would assist in determining a constructive program for vocational training for the city of Richmond, including: (1) the general industrial situation, proportion of workers to the total population, and social attitude toward industrial work; (2) the economic status of the community; (3) variety and concentration of industries; (4) civic and social desirability of the industries represented; (5) demands upon the workers with respect to knowledge and skill necessary for effective service; (6) amount and character of vocational training furnished by the industries, and that must be supplied by the school system.

The field work of the survey was conducted during the summer and fall, and a synopsis of the findings and recommendations was published and widely distributed in advance of the convention. Leaders of discussion were carefully selected, and three entire sessions as well as parts of other sessions of the convention were devoted to the consideration of various phases of the survey. The complete report of the survey was later published as a bulletin.[8]

Similar techniques were employed in a vocational education survey of Minneapolis, during the fall and winter of 1915, and the principal recommendations resulting from the investigation were discussed at the convention of the National Society in that city in January, 1916.

National Aid for Vocational Education

The outstanding accomplishment of the National Society for the Promotion of Industrial Education, up to that date, was the culmination, in 1914, of the effort to secure action by the Congress on federal legislation for vocational education. This action took the form of provision for a national commission to make a study and report on the need of federal aid to the states for the encouragement of vocational education.

From the beginning of its existence "the chief goal of the National Society was to secure an adequate federal law providing national aid for industrial education."[9] The appointment of the National Commission was regarded as an essential preliminary step in the determination of the needs to be met, and the measures necessary to meet the needs. One of the earliest moves made by the National Society, at its first convention in January, 1908, was the creation of a committee of ten to study and report on this subject. Copies of this report were sent to the President of the United States, the Vice-President, the Speaker of the House, and the Commissioner of Education, urging upon them "the duty of an adequate consideration of this subject by those responsible for the national progress."

Tracing the development of the efforts to secure federal legislation, it may be noted that the first tangible step was the introduction in the House of Representatives, in 1907, by Charles R. Davis of Minnesota of a bill calling for "annual appropriations from the national treasury for maintaining instruction in agriculture and home economics in secondary agricultural schools, and instruction in mechanic arts and home economics in city secondary schools." This, of course, was not a vocational education bill, and the National Society let it be known that it was not satisfied with its provisions and would not support the bill. Many educators actively opposed the Davis bill, under the leadership of the National Education Association and the Commissioner of Education, Dr. Elmer Ellsworth Brown, who demanded that "before such a bill should be approved, a study should be made of the whole problem, and a bill framed in conference with experienced school superintendents."

Two years later, in 1909, spokesmen for organized labor were instrumental in having a bill drafted which incorporated their ideas on the subject of industrial education, and they secured the support of Senator Jonathan P. Dolliver of Iowa, who introduced the bill in the Senate. Although the agricultural and labor interests seemed to be in favor of what was then known as the Davis-Dolliver bill, the National Society "refused to support the bill, and continued to believe that an investigation of the whole subject should be made."

In 1911, Carroll S. Page of Vermont became the chief sponsor of the legislation in the Senate, by introducing a new bill in April of that year. The November, 1911, meeting of the National Society resulted in the formulation of a number of specific recommendations for modification of the Page bill. When these suggestions were not incorporated in the revision of the Page bill, it was decided that the time for more vigorous action had arrived.

The next step, as we have seen, was Dr. Prosser's visit to Washington, in March, 1912, "to help draft a new Page bill." The interests behind another bill of interest to educators, known as the Smith-Lever bill to promote agricultural extension work in the several states, were powerful enough to secure postponement of action on the revised Page bill for aid to vocational education, and instead the Smith-Lever agricultural extension bill was enacted into law in January, 1914.

[8] *The Richmond Industrial Education Survey*. Bulletin No. 162. U. S. Bureau of Labor Statistics. Government Printing Office, Washington, D. C., 1915.

[9] Charles A. Bennett, *op. cit.*, p. 542.

Appointment of the National Commission

When it became evident that the Page bill could not be passed at that session of Congress, the National Society concentrated its efforts on securing the adoption of a joint resolution creating a Commission on National Aid to Vocational Education, and in this it was successful. The major credit for this momentous achievement belongs to Dr. Prosser. He it was who sought out, assembled, and co-ordinated the activities of an unprecedented array of supporters. He began with the members of the technical staffs of the state departments of education, with whom he had worked in the planning and enactment of state legislation, and through their co-operation he was able to enlist the support of senators and representatives from these and other states. In addition, the board of directors of the National Society, which included prominent leaders in industry, business, labor, agriculture, and finance, provided the nucleus for a host of proponents whose efforts were combined and co-ordinated with telling effect.

The personnel of the commission reflected the magnitude of the undertaking and the weight of the influences at work. In accordance with the Act of Congress approved January 20, 1914, President Woodrow Wilson appointed a commission of nine members "to consider the subject of national aid for vocational education and report their findings and recommendations not later than June 1." The following persons were appointed: Senator Hoke Smith, Georgia; Senator Carroll S. Page, Vermont; Representative Dudley M. Hughes, Georgia; Representative Simeon D. Fess, Ohio. John A. Lapp, director of the Indiana Bureau of Legislative Information, Indianapolis; secretary of the Indiana Commission on Industrial and Agricultural Education, 1912. Florence M. Marshall, director of the Manhattan Trade School, New York City; member of the Massachusetts Factory Inspection Commission, 1910. Agnes Nestor, president of the International Glove Workers Union, Chicago; member of the Commission on Industrial Education, American Federation of Labor. Charles A. Prosser, executive secretary of the National Society for the Promotion of Industrial Education, New York. Charles H. Winslow, special agent for industrial education, U. S. Bureau of Labor Statistics, Washington, D. C.; member of the Massachusetts Commission on Industrial Education, 1906–1909.

The commission organized on April 2, 1914, by electing Hon. Hoke Smith as chairman. Ernest A. Wreidt, director of the Public Education Association of New York City, was appointed secretary of the commission on April 17. An office and statistical staff of 45 persons assisted in the work.

On June 1, 1914, the commission made its report to Congress, after six weeks of strenuous activity that included a number of public hearings, conferences with representatives of all interested departments, boards, and bureaus of the Federal Government, examination of the results yielded by numerous questionnaires, as well as independent study and research. The report was issued from the Government Printing Office in August, 1914, as House Doc. No. 1004, in two volumes: I. Report of the Commission, with text of the proposed legislation; II. Transcript of the Hearings before the Commission.[10]

The bill embodying the proposed legislation, prepared and recommended by the commission, was introduced in the Senate by Senator Smith, and in the House by Representative Hughes. In each case the bill was referred to the committee on education. When enacted, it thus became known as the Smith-Hughes Vocational Education law. It does not seem necessary to take the space here for an analysis of the provisions of the law.

[10]Bawden, Progress in Vocational Education. *Report of the Commissioner of Education*, for the year ended June 30, 1914, Vol. 1, Chap. 11, pp. 237–289. Government Printing Office, Washington, D. C.

(To be continued)

A Basic Glossary and Vocabulary in Printing

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These are lists and definitions of trade terms and related words which are common to the fundamentals of hand composition and to printing as a trade. Students should be expected to be familiar with the meaning as well as the spelling of all terms and words listed here.

A

abbreviation
accent
ads
advertisement
alignment
alive
alley
alloy
ampersand
antimony
apostrophe
apprentice
apron
Arabic numeral
ascender
ascending stroke
asterisk
author
author's correction
author's proof

(Straight Composition)

aligning rule
angular letter
announcement

ADDENDUM: Matter added to a book to supply omission in the original work.

ANTIQUE TYPE: Heavy face of Roman type having uniformly thick lines which resemble early printing, when the outline of the letters was thickened by being impressed on soft, damp paper.

APPENDIX: An addition in the back of a book, listing material related to the subject

but not necessarily essential to its completeness.

B

bad break
bad spacing
bank
bank man
bastard
batter
beard
bed
beginning quote
belly
benzine
bind
blank out
bodkin
body
body matter
body type
bold face
border
box
braces
bracket
brass rule
brayer
break line
brevier
burr

(Straight Composition)

Bernhard Gothic
blank verse
border unit
bow
butted rule

BANK: A cabinet with a sloping top upon which composed matter is temporarily placed for convenience in assembling live material.

BASIS SIZE: A certain specified size of a sheet of paper of any given grade or weight, used in conjunction with the basis weight as a standard for figuring the weight of other sizes of paper of the same grade and relative weight.

BASIS WEIGHT: The weight of a ream of a given grade or weight of paper in sheets of a certain specified size, which is regarded as standard for figuring the weight of all other sizes of paper of the same grade and relative weight. In the Government Printing Office, the basis weight is given for 1000 sheets instead of a ream.

BASTARD TITLE: An abbreviated title page preceding the regular full title page, usually giving only the name of the book.

BEARD: The sloping part between the face and shoulder of a type character.

BIBLIOGRAPHY: A list of writings, books, or manuscripts, related to a given topic or author, showing titles, editions, authors, and dates of publication.

BODONI TYPE: Roman style letters, designed and cut by Giambattista Bodoni, of Parma, Italy, in 1771. This type face is still popular and the best example of a modern Roman type.

BODY TYPE: Plain type used in body matter as distinguished from the larger and more decorative display types.

BOND: Paper of hard, tough texture, included in the general group classified as writings. The better grades are usually made from linen rags.

BOOK PAPER: Paper that is especially suitable to the printing of books and similar grades of work. It is made in many finishes, grades, sizes, colors, textures, and weights.

BOXHEAD: A heading enclosed within rules, usually at the top of a page or column. Commonly used in tabular work at the top of a column of figures.

BRISTOL BOARD: Fine cardboard or pasteboard, usually pasted or plied and designated by the number of plies in the sheet, such as two-ply, three-ply, and so forth.

C

cabinet
California job case
capitals
caps
caption
carbon monoxide
caret
case
  Cal. Job
  dirty
  foul
  type
case bracket
cast
cast type
center
centered line
century
character
chase
Cheltenham
circumflex
classification
clause
clean proof
clockwise
close punctuation
close quote
close up
colon
color form
column rule
comma
common noun
composed matter
composing
  room
  stick
compositor
compounding
compound sentence
complex sentence
consumer's goods
condensed
condensed letter
consonant
contents
copper
copy
  cutter
  editor
  fat
  follow
  good
  holder
  lean
  manuscript
  original
  poor
  printer
  reader
  reprint
  revised
  typewritten
  unedited
  unrevised
correcting
corrections
  author's
  galley
  making
  office
  press
customer
cutting
cursive type
cylinder

(Straight Composition)

close leaders
copperplate Gothic
corner pieces
corner quads
couplets

CABINET: *See* Type Cabinet; Furniture Cabinet.

CALIFORNIA JOB CASE: A popular style of case which originated in San Francisco, having only one case for all the letters and characters instead of two, such as the upper and lower used in the news case.

CAPTION: *See* Legend.

CASE: A shallow wooden or metal tray divided into compartments of different sizes, one for each character in a font of type, and one for each size of spaces and quads. In some instances, cases come in pairs, the upper and the lower.

CASE STAND: An open wooden or metal frame used to support type cases.

CHASE: A sturdy, rectangular iron or steel frame in which type is arranged and locked up for press or for foundry: Platen press chase, cylinder press chase, Twin chases, Foundry chase.

COLOPHON: Literally meaning "finishing stroke." An inscription placed at the end of a book giving facts regarding its production, such as the printer's name, date, place of publication, the name of the type, and the kind of paper used. An emblem or imprint of a printer.

COMBINATION CUT: A printing plate which is part half tone and part line cut.

COMPOSING RULE: A thin piece of type-high brass or steel, with ears on the upper corners, against which type is placed in the composing stick. It is also helpful in transferring type from stick to galley, tying up pages, and the like.

COMPOSING STICK: A small, oblong metal hand tray in which type is placed and arranged in lines. It has three sides, one of which is adjustable and may be fastened securely to control the length of line to be set.

COMPOSITION: The process of setting type and preparing it for printing. The composed type mass ready for printing.

COMPOSITOR: One who sets type and prepares it for the press.

CONTENTS: *See* Table of Contents.

COPYRIGHT: The exclusive right to print, sell, or reproduce any literary or artistic work.

COUNTER: The shallow depression between the lines in the face of a type letter or character.

CREASING RULE: *See* Rule and Scoring Rule.

CUNEIFORM: From the Latin *cuneus*, a wedge, hence meaning "wedge-shaped." Applied especially to the wedge-shaped characters on Persian, Babylonian, and Assyrian inscriptions.

CURSIVE: *See* Script.

CUTTING RULE: *See* Rule.

D

Dagger
dash
dead
  form
  matter
declarative sentence
defective
defective letter
depth
delete
derivative
descender
descending stroke
devil
diacritics
diagonal line
dieresis
digraph
dirty case
dirty proof
display type
distribution
distributor
division
double dagger
double leaded

doublet
drive out
dumping
dupes
duplicate

(Straight Composition)

diagonal indention
ditto marks
dotted leaders

DEAD: A term used to indicate type that has been used and is ready for distribution.

DEDICATION: A name or message appearing as part of the preliminary material of a book, expressing affection for some friend or cause.

DELE: A proofreader's symbol used to indicate that certain superfluous material is to be deleted.

DIDOT POINT SYSTEM: A system of measuring type improved from the Fournier system by François Didot in France in the eighteenth century. The Didot system is still in use in France and in many other countries. The United States and Great Britain use a further modification of this system.

DIE: A metal plate or block engraved with letters or designs, used for embossing, stamping book covers, and the like. A sharp edged device for cutting designs from paper, cardboard, and the like.

DISPLAY TYPE: Larger sizes of type of conspicuous design used for headings, advertisements, and other display purposes.

DISTRIBUTION: The process of returning type, rules, leads, and other printing materials to their respective receptacles after they have been used.

DOUBLE RULE: *See* Rule.

DOUBLET: The duplication in composition of a word, phrase, or sentence. A corrected slug inserted in type without removing the incorrect slug, thus causing a repetition.

DUMMY: A plan of a piece of printing showing the size of page and general appearance, sometimes made by pasting proofs into a booklet of blank pages of the desired size.

E

ear
editing
edition bookbinding
editor
electros
electrotype
electrotyping
elementary
elements
ellipses
em
emphasis
en
ending quotes
engraving
exclamation mark
exclamatory sentence
expanded
extra condensed
extract

(Straight Composition)

elite typewriter
Elrod machine

EM: The square of any type body, occupying the same space necessary to accommodate the letter M. The em measurement is commonly used to measure type composition and to designate printing materials such as em dashes, em leaders, em quads, and the like.

EM QUAD: A block of metal less than type high which is used to fill in blank spaces of a line of type. The em quad is equal in dimension to the square of the point measurement of the size of type being used. Quads are cast in multiples of ems and are designated em quad, 2-em quad, 3-em quad, and the like.

EN QUAD: A piece of metal less than type high which is used to fill in blank spaces of a line of type. It is the same depth as an em quad and one half its breadth; the smallest unit known as a quad. Also called nut quad to avoid confusion in the sound of the terms em quad and en quad.

EQUIVALENT WEIGHT: The weight of a ream of a given grade or weight of paper in sheets of any size other than the specified basis size for that grade and relative weight. The basis weight is the standard by which the equivalent is figured. In the Government Printing Office, weights are given in units of 1000 instead of a ream.

F

face
  bold
  heavy
  light
  rule
  type
  up
family
fat
fat matter
feet
fill out
final reading
five-to-em space
first proof
floor pi
flush
flush-to-left
flush-to-right
folding
follow copy
font
foreman
form
  dead
  live
  page
  planer
foul case
foul proof
foundry proof
foundry type
four-to-em space
frame
full measure

(Straight Composition)

foundry border

FACSIMILE: An extra copy or reproduction. Frequently applied to autograph signatures.

FALSE TITLE: *See* Bastard Title.

FAMILY: A group of type including all the variations of size and style of one definite design, such as the Cheltenham family and the Caslon family.

FEET: The two projections on the bottom of a piece of foundry type formed by separating the base with a groove.

FOLIO: A leaf or page of a manuscript or book. A number. A sheet of paper folded once.

FONT: A complete assortment of one size and style of type, the quantity of each letter or character being supplied in proportion to its frequency of use.

FOOTNOTE: A comment placed below the text at the foot of a printed page.

FOREWORD: An introductory note written by someone other than the author.

FORM: Type or other matter from which a printed impression or plate is to be made, properly arranged and securely fastened in a chase.

FOUNDRY PROOF: A proof taken for final reading before making plates. A proof taken from plates.

FOURDRINIER: Pertaining to the machine for making paper in one continuous web, named after the developers of the machine, Sealy and Henry Fourdrinier.

FRONTISPIECE: An ornamental drawing or illustration facing the title page.

FURNITURE: Pieces of metal or wood of varying lengths, cast or cut in multiples of picas and less than type high. They are used to fill in blank spaces in making up forms and to aid in fastening the printing mediums securely in the chase.

G

galley
  boy
  press
  proof
gasoline
gauge
general style
Gothic
graduated
groove
guide line

GALLEY: A long, shallow tray (usually metal) used as a receptacle for composed type matter or other printing surface. It has three upright sides, one end being left open to facilitate easy transference of type to or from the galley.

GLOSSARY: A list of unusual words and terms placed in the back of the book, defined to explain their meaning as used in the text.

GROOVE: The narrow trough or channel which divides the end of a piece of type into two feet.

GUILD: An association of craftsmen. The guild was the beginning of present-day trade unions.

GUTENBERG BIBLE: The 42-line Bible printed by Johann Gutenberg, of Mainz, Germany, sometime between 1450 and 1456. The pages were printed in two columns of 42 lines each. This was the first Bible, and probably the first complete book, printed in Europe from movable type.

H

hair space
hand comp
hand composition
heading
heavy element
hell box
height-to-paper
horizontal
horseplay

(Straight Composition)

hairline rule
half diamond inden.
hanging indention
hyphen leaders

HAIRLINE: A very fine or delicate line connecting the stem or body marks of a letter. Any delicate line in type, brass rules, or engraving.

(To be continued)

Industrial Arts and Vocational Education

John J. Metz, *Editor*

HOW ABOUT THAT SAFE DRIVING COURSE?

Have you, or your automotive department made arrangements for teaching safe driving? High school driver education is very important and soon the ten-year total of training young drivers will reach the four million mark.

Evidently, however, the peak point of this endeavor seems to have been reached. The most rapid strides were made between 1947 and 1951, according to the records of the accident prevention department of the Association of Casualty and Surety Companies, but the number enrolled at the end of the school year 1951–52 showed a decline in the totals of participating secondary schools and student enrollment.

During the 1951–52 school year the number of schools sponsoring driver education courses was increased by 191, while the year 1950–51 had shown a gain of 728 over the number of public high schools that had offered these courses in 1949–50. Likewise, the 1951–52 gain in eligible students enrolled was 53,951 over the 1950–51 school year's driver education enrollees, but the latter year's increase over 1949–50 was 100,000.

Last June, 8218 secondary schools reported to the Association that they had offered a driver education course during the 1951–52 academic year. These schools, however, represented only 41 per cent of the nation's 20,140 secondary schools in which driver education should be offered, if every boy and girl is to be properly equipped to take the wheel of the family automobile when the time arrives to obtain a driver's license.

Improper and haphazard training of young drivers is responsible for a large proportion of the nation's increasing toll of death, injury, and property damage in motor vehicle accidents. This should not be permitted to continue for very long, when driver education courses are available to every school in the nation. Every high school student should receive driver education before graduation.

Is your school offering this necessary instruction to its students?

YOUR FIRST-AID EQUIPMENT

Accidents, as everyone knows, are not scheduled to happen at any specific time. But as everyone knows also, when an accident does occur, something must be done about it at once.

That brings to mind the administering of first aid. The severity of the injury will, of course, determine whether the teacher should attempt to give the first aid, or whether a doctor or nurse should be brought in at once.

Suppose the injury is of a minor character, say a small puncture or a scratch. Here, again, it is up to the teacher to decide whether it is safe for him to apply a suitable antiseptic and let it go at that, or whether he should send the injured student to a nurse or a doctor after first aid has been administered to him.

There are really no injuries that may be called minor. The slightest scratch may become infected and cause a troublesome wound which may require the amputation of a limb, or the loss of an eye. However, there are serious accidents, say when a finger or a hand or some other part of the body is cut off, or where severe concussion takes place, or where some member is broken or crushed. Under such conditions it is well to see that the injured person is placed in as comfortable position as possible and send for medical aid at once.

All of this can be done more or less readily in schools located in the larger communities, but in rural districts or small villages, nurses and doctors may not be so easily reached, which all points to the fact that teachers of industrial arts and vocational education should know a great deal about giving first aid, no matter how slight or severe the injury might be.

That then brings up the question of the first-aid kit. Luckily, some manufacturers of medical supplies offer these kits in various sizes. Experience has taught them what to put into the kits which relieves the teacher from determining what and how much to order. It is well to buy a kit that is a little too large rather than one that is too small.

After the kit has been obtained, the next thing is to determine where to put it. Be sure to choose a place that is as free of dust as possible so that the contents of the box can be kept clean.

And don't forget to read over your first-aid manual from time to time. When the need for giving aid to some youngster arises, you must know what to do and there will be little time to look up the directions in the book.

Be prepared and then pray that nothing will happen.

A HUGE ROLLING MILL

Another shining example of what our scientific mechanical age can produce is the huge rolling mill presently being built by the Aluminum Company of America at Davenport, Iowa.

Davenport was selected as the mill site because of the other facilities already existing there, such as large heat-treatment furnaces and wide continuous rolling equipment.

This new mill will be capable of producing widths up to 10 ft. of tapered sheet and plate for aircraft.

Tapered sheet and plate are used in fabricating aircraft wings. The sheet's thickest end is placed nearest the fuselage of the plane; thus, the sheet tapers thinner as it reaches toward the wing tips, where not as much strength is required.

The principal advantage of tapered sheet and plate over that of uniform thickness is a weight saving of up to 35 per cent without loss of strength. It is evident then that the use of tapered sheets is very advantageous.

Tapered sheet on the new mill will be produced in lengths exceeding 33 ft. Present equipment limits the production of rolled tapered sheet to widths slightly over 5½ ft., and to lengths a little over 25 ft.

The extra wide and long sheet can replace two or three narrower sheets and thus eliminate many costly joining operations during construction of both civilian and military aircraft.

Success of the rolled tapered sheet and plate process is indicated by substantial increases in the use of rolled tapered sheet and plate by the aircraft industry.

At the present time, two of the principal air force planes in action have wings made of rolled tapered sheet.

The Multiple Demonstration Method

GEORGE E. HAYNES, JR.
Booker T. Washington High School
Houston, Tex.

The amount of information that the industrial-arts instructor must disseminate to his classes in a modern industrial-arts program can be a taxing venture if the coverage of this material is not well planned. In the general shop, the multiple demonstration method can act as a partial solution to the problem of getting the class started on a project much sooner than the use of regular methods of starting the class.

The instructor of the general shop is usually concerned with offering exploratory experiences and in assisting the learner to learn through the development of projects in approximately six or more areas. The six areas selected are rather meager when compared with the thirty thousand job titles that offer unlimited areas for exploration. However, the six selected by the instructor and supervisors also propose problems that are challenging. When a class meets for the first time, it proposes the problem of getting started in the shortest amount of time for the maximum utilization of their allotted time. The general method used in starting a class is the demonstration.

"The Demonstration . . . the procedure of showing the learner how to do something is used extensively in practical Arts and Vocational Education."[1]

The multiple demonstration is used quite commonly with the project method within the comprehensive general shop. The demonstration is usually broken down into the following categories: (1) class demonstration, (2) group demonstration, (3) individual demonstration. The demonstration should be well planned and skillfully performed. Justification for the lavish use of this method can be partially attributed to the fact that:

"The method is objective and concrete. Visual and other sense perception come to the aid of the sense of hearing, which brings the explanatory statements that accompany the demonstration."[2]

The multiple demonstration method is that method of demonstrating to the student the operation and procedures necessary for the completion of a given project that is made from two media. It is commonly associated with the group process. A project composed of metal and wood can be considered as a starting point for a multiple demonstration. It does not carry with it the implication that the student cannot visualize, design, and construct a project of his own choosing. When the pupil is desirous of designing his own project it should be based on the student's appreciative background and the fundamental operations covered in the multiple demonstration. The instructor might be concerned with the area arrangement of his shop in the selection of projects, however, when this type of project is selected, all the operations in one area can be completed within that area before moving to the next area for completion of the project.

It might be further noted that by establishing certain area combinations, record keeping might be simplified.

In performing this demonstration the instructor should have close at hand every item necessary for the completion of his demonstration: tools, materials, drawings, job sheets, some related information and pictures of related projects. Two or more basic projects may also be on display at the time of the demonstration. All of these aids will contribute greatly toward the understanding of the project on the part of the pupil. The pupil, at this time, is playing the role of a spectator, realizing that in time to come, he must be a participant, and to do so will require the knowledge he has acquired while playing the role of spectator.

Assignment for related information can be given at the time of the demonstration. Stimulation for study outside the classroom might be built up by setting up demonstrations that lead to curiosity on the part of the pupil. For example: During a demonstration of fastening wood to plastic, it can be shown that a greater bind is found between open grain woods and plastic than between closed grain woods and plastic. The actual viewing of the grains of wood under the microscope could cause a great deal of outside research on the part of the pupil. Research in plastics might be stimulated through a demonstration showing the effects of different solvents on thermoplastic and thermosetting plastic. Through this it is felt that some thought has been given to the context of that being covered.

"So the real point of concrete context is that it gives the learner something to work and experiment with; something that can command his will and energy, and still keep his processes under control."[3]

The selection of the right project for this approach is as important as any other factor as far as the use of this method is concerned. The project must contain the operations that are felt to be vital to the objectives of the course. Too often failure to stimulate participation is because of poor selection of projects. School projects should follow the modern trends in industry, and attempt to make the products attractive and useful. Ideas can be seen in all types of shops and stores. It can be further noted that a large percentage of products produced for the market today are composed of two or more types of material, which is an additional factor to be considered. Organized materials for the selection of projects are rather meager. Dr. Gordon O. Wilber states that:

"The difficulty in this approach lies in

[1] F. T. Struck, *Creative Teaching* (New York: John Wiley & Son, *c.* 1938), p. 348.

[2] Struck, *loc. cit.* p. 348.

[3] James L. Mursell, *Successful Teaching* (New York: McGraw-Hill Book Co., Inc., *c.* 1946), p. 82.

finding suitable projects involving activities in the desired areas."[4]

In addition, projects should be related to present-day living.

The evaluation of this method should be constant on the part of the instructor, as should be the evaluation of the use, or the effectiveness of any other method used.

On the pages to follow will be found a job sheet, photograph, and drawing which are an example of the three basic steps necessary in the use of the multiple demonstration method.

The following is a list of projects taken from various sources that can be considered suitable for the multiple demonstration method.

Industrial Arts and Vocational Education

George W. Schneider, *Cigarette Holder*, June, 1951, p. 244.

George N. Bollinger, *Leather Covered Table Lamp*, Jan., 1951, p. 27.

Chris H. Groneman, *Magazine Rack*, Apr., 1951, p. 167.

W. Chatfield and G. Nolan, *Planter Lamp*, Feb., 1951, p. 73.

W. Chatfield and F. Sullivan, *Fireplace Ash Tray*, Oct., 1950, p. 317.

Thomas H. Roberts, *Tile Top Flower Table*, Sept., 1950, p. 284.

Popular Science

Cueva Heyburn, *Glass Brick Top Off Modern Coffee Table*, Jan., 1950, p. 195.

Walter E. Burton, *Magnetic Engine Whizzes on Dry Cells*, p. 205.

L. M. Cox, *Auto Race in Your Back Yard*, Aug., 1950, p. 145.

——— *Scraps and Solder Become an Engine*, Dec., 1950, p. 196.

——— *Rolled Out Coffee Table*, Dec., 1950, p. 204.

Myles De Russey, Jr., *Bag and Belt Set Cut From Cowhide*, Apr., 1949, p. 194.

John J. Harper, *Plywood and Gleaming Brass Bind Album*, Feb., 1949, p. 211.

Harry A. Zoback, *Internal Carving Decorates Plastic Lamp*, Feb., 1949, p. 199.

Popular Mechanics

R. J. De Christofora, *Wall Flower Holder*, Feb., 1949, p. 193.

——— *Trinket Chest*, Mar., 1949, p. 208.

Bob Thor and Lundquist, *"Torchy"* Jet Speedster, May, 1949, p. 207.

Elma Waltner, *Frosted Candy Plate and Jewel Box*, Feb., 1950, pp. 178–179.

——— *Candle Holder*, Feb., 1950, p. 189.

——— *Jewel Box*, Oct., 1950, p. 169.

School Shop

Charles J. Varga, *Marbleized Projects Are Really "Keene,"* Dec., 1950, p. 18.

Herbert Anderson, *Add Upholstering to Your Program.*

A. R. Hegman and Stanley A. Glow, *Attractive Carving Set*, Mar., 1951, p. 10.

[4]Gordon O. Wilber, *Industrial Arts in General Education* (Scranton, N. Y.: International Textbook Co., *c.* 1948), p. 112.

The Night Lamp

This project is so designed that it will supply a small glowing light or one that is suitable for reading. A small candelabra lamp socket and bulb supply the small glowing light that seeps through the strips of plastic that are fastened between the pieces of wood.

BILL OF MATERIALS

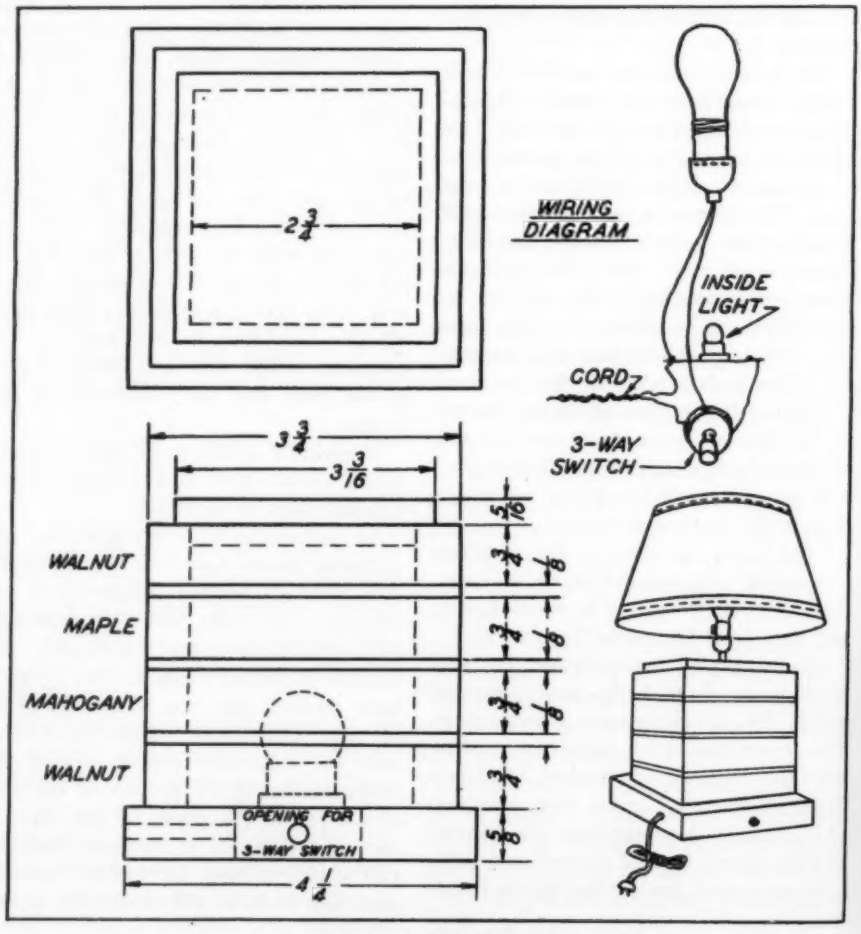
No. of pcs.	*Name*	*Material*	*Size*
2		Walnut	½ x ¾ x 17
1		Maple	½ x ¾ x 17
1		Mahogany	½ x ¾ x 17
1	Base	Maple	¾ x 3¾ x 4½
1	Top	Maple	¾ x 3¾ x 3¾
1 sheet		Plastic (transparent)	⅛ x 6 x 6
		Plastic solvent	
		Wood glue	
		¼-in. dowels	
1		Bullet catch	
5 ft.		Electric wire	
		Three-position electrolier switch	
1		Candelabra lamp socket	
1		Lamp socket with cap threaded for ⅜-in. nipple	
1		⅜-in. nipple with nut	
1		Double-prong plug	
		Shellac, varnish	

Night lamp

Suggested Procedure

1. Cut all wood and plastic to prescribed dimensions.

2. Fasten plastic to wood with a plastic solvent, apply very little pressure.



Details of night lamp

3. Make a 45-deg. cut on the wood or plastic that has been fastened together.

4. Matching the wood and plastic joints, fasten together with wood glue.

5. Cut your base 4¼ in. and sand all edges.

6. A rectangular hole is cut in the base to receive the three way electrolier switch.

7. This is placed so that the switch is concealed within the walls of the lamp.

8. Drill two small holes through the outer edge of the base into the rectangular hole; one should be the size of the wire, the other the size of the switch handle.

9. Fasten the box to the base with ¼-in. dowels and wood glue.

10. Cut and shape the top piece as shown in the detail drawing.

11. Drill a ⅜-in. hole through the center, insert a nipple and place a nut on the bottom.

12. Attach a socket and wire as shown in the drawing.

13. Shellac — steel wool — varnish.

PROBLEMS AND PROJECTS

JEWEL BOX OR CANDY DISH

NORMAN BROOKS
Penn High School
Greenville, Pa.

Incorporating wood turning and plastic fabrication, the project illustrated and described herein, involves some very fine jig work in making the cover from .080 transparent Acrilic Resin Plastic (Lucite or Plexiglas).

Making Jig for the Cover

The jig shown in Figure 2 should be made of clear dry maple free from sapstreaks. Inside and outside templates must be used when turning the jig parts so that proper clearance may be obtained and tolerances in plastics allowed for.

The convex part of the jig has a pin fixed in the top center as shown in Figure 2, to center the plastic when forming and also to center the convex part of the jig for quick and accurate operation.

If the jig has too close a fit there will be a great deal of "mark off." If it is too loose, wrinkles may form on the edges. It is suggested that one part of the jig be left on the faceplate for turning alterations, or until a near perfect fit is obtained.

The jig must be sanded and *polished smooth*, and it must be *free of dirt* when the cover is being formed.

Making the Plastic Cover

Material .080 thick is recommended because thinner pieces will wrinkle at the edges and stretch too much, and thicker pieces will offer too much resistance in shaping, causing too much "mark off." The term "mark off" refers to those imperfections that show on the face of the finished plastic and may be caused from excessive pressure, dirt, rough surfaces on jig, or any other irregularities on the plastic or jig.

Saw the material into 7½-in. squares, and drill a hole in the center to fit the centering pin on the jig. A sawing jig for your band saw and a sanding jig for your sander should be made to assure an accurate round disk. A pin in a board, clamped to the table of the band saw, with the pin at 90 deg. to cutting edge of the blade will make a suitable jig for cutting the disk round. Several should be cut at one time because singles chatter so much that they spawl out on the underside during the operation because of the chatter. If you have only one to cut, support it by cutting a piece of ¼-in. plywood round at the same time.

The same sort of a jig for sanding edges of disks should be used on the sanding machine. Soften corners after sanding round.

Masking paper is taken off after all work on the disk is finished and the plastic is then cleaned in preparation for heating and shaping.

Candy dish

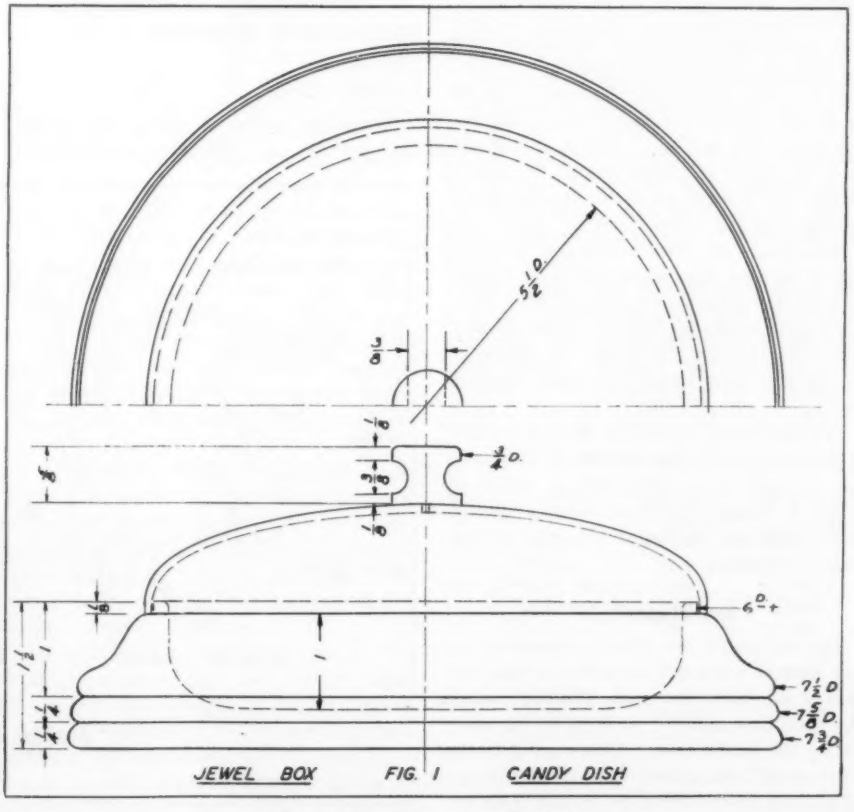


Fig. 1. Details of candy dish

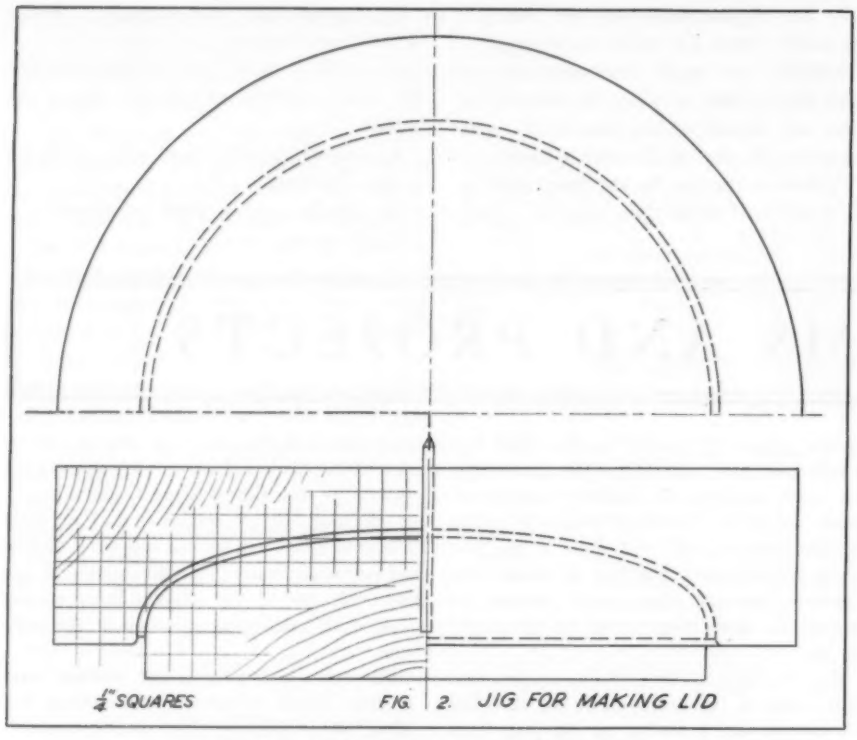


Fig. 2. Jig for making candy-dish cover

With the heating oven set at 250 to 275 deg., place the plastic on a piece of wood or asbestos and place it into the oven. Be sure that everything that comes in contact with the plastic is clean. Each dirt speck will make a mark on the finished part. The plastic should be heated so that it is flexible and workable but not so soft and sticky that it will adhere to other pieces of heated plastic. Too much "mark off" will be noticeable if material is too hot and soft when working.

With gloves on, place heated disk on lower half of jig and press upper half down firmly, or until in contact with plastic over entire jig. Always remember that too much pressure will cause excessive "mark off." If unsuccessful the first time, reheat and make a second try.

The knob on the lid may be made of wood or of plastic rod. It is suggested that ¾-in. plastic rod be used, and fabricated as shown in Figure 1. Cement the plastic knob to the lid with methyline dichloride or any suitable plastic cement.

The Wood Base

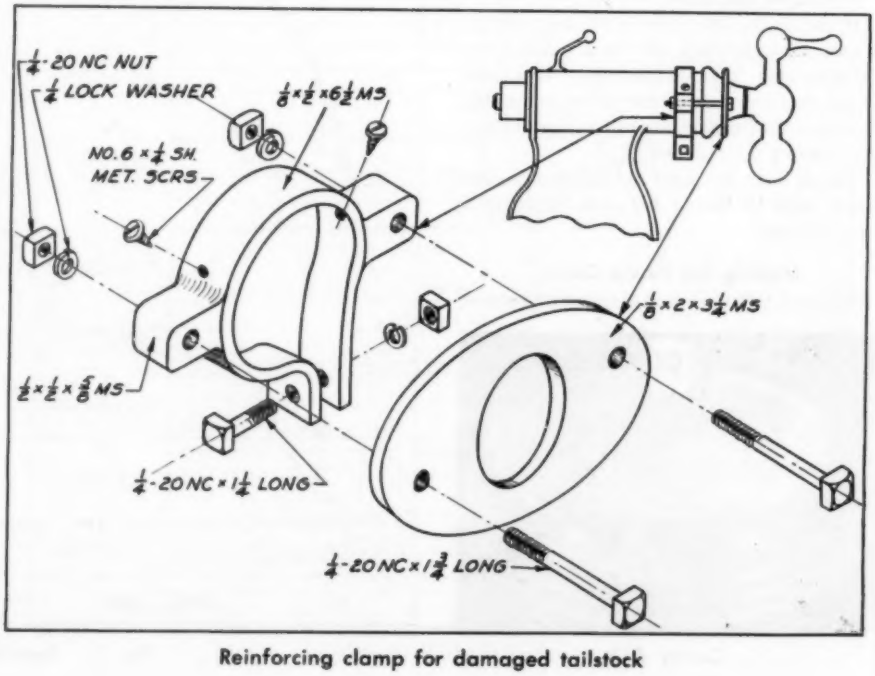
The bottom of the dish is turned out of any suitable wood, but preferably a light colored wood should be used. The top rim of the wood base must be made to fit the lower rim of the plastic cover. French polish in the lathe or preferably spray with lacquer for an all-purpose finish. Cover the bottom with felt to protect table and dresser tops.

REINFORCING CLAMP FOR DAMAGED TAILSTOCK

WALDEMAR E. KLAMMER
High School
Truman, Minn.

Stripped or broken threads on the tailstock casting or cap may result from using too much force on the crank handle. Replacing the entire tailstock is an unnecessary expense if some means can be found to reinforce the damaged parts. Our shop now has two lathes with easily constructed clamp and bolt assemblies as shown in the sketch. Since sizes and shapes of tailstocks vary considerably, materials used in the sketched assembly are listed but no dimensions are included. No doubt, the whole design may have to be revised to fit in some cases.

In the sketch the only parts welded are the ears on the sides of the clamp. If the tailstock is of material that can be readily welded the clamp can be eliminated and the ears mounted directly on the tailstock casting. The two short metal screws are used to fasten the clamp more securely in order to prevent it from slipping toward the cap. These screws are run through the clamp and into the casting.

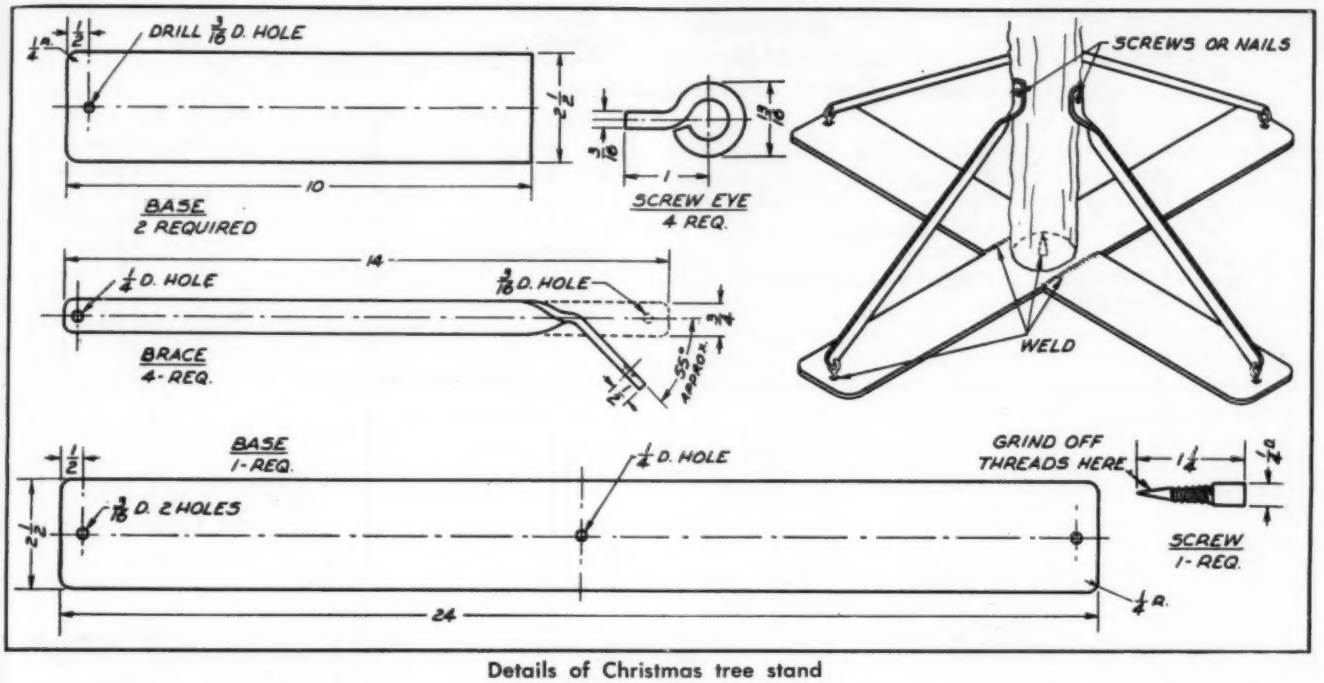


Reinforcing clamp for damaged tailstock

CHRISTMAS TREE STAND

JOHN FONTANA
Industrial Teacher Training Department
New York State College for Teachers
Buffalo, N. Y.

Practically every industrial-arts teacher is confronted at Christmas time with that perennial request for a Christmas-tree stand. There is the usual hurried and temporary stand which is promptly discarded after being used. The stand illustrated here is simple to construct, easy to use, and does a very fine job of holding a 3-in. diameter or smaller tree. Variations of this idea, using two 2 by 4-in. lumber, with a half lap joint for a base instead of the metal base, may also be designed. The tree may be placed into a one-



Details of Christmas tree stand

gallon fruit can obtained from your cafeteria and filled with water to keep the tree fresh longer. It must be soldered around the screw to make it watertight.

The four hook arms are bent upward at one end of each of the braces, so that a screw or a nail can be driven into the tree. All of the dimensions may be varied to suit the needs of the builder. A stand of this type has been used for fifteen years and is just as serviceable as ever. You will be pleasantly surprised at how easily this may be constructed and how beautifully it works.

ELECTRIC DOOR CHIMES

BERRY E. MORTON
Assistant Professor of Industrial Arts
Indiana State Teachers College
and
DAVID C. JONES, Student
Indiana State Teachers College
Terre Haute, Ind.

Door chimes make an excellent project for the unit electrical shop or the composite general shop. The chimes are designed to operate from a standard 10-14 volt bell transformer; however it will also function well when attached to four 1½-volt dry cells wired in series. The parts required to make the door chimes can be fabricated from materials usually on hand in unit electrical shops or composite general shops. The processes involved in the making of the various parts are simple and require no special tools or exceptional skills on the part of the student. The chimes can be completed in a rather short time. One especially desirable feature of this particular door chime is that the tone can be easily adjusted.

The box covering the striker mechanism of the chimes, not shown on the drawing, may be made from the metal of a large tin can, from sheet plastic, or from many other materials such as sheet copper, brass, or aluminum. The cover, while simple in construction, provides the student with almost unlimited possibilities for creative expression in design.

One precaution must be observed in mounting the tone bars if they are to function properly. The holes for mounting the tone bars must be drilled at the nodes. A simple method of locating the nodes on the tone bars is to cover each bar with chalk dust. Then, place the bar across two tightly stretched strings and sharply strike the tone bar with a mallet. The chalk dust will collect and form two small piles on each bar, one small pile of chalk dust forms at each sound node. A pencil mark should then be made in the center of each of the small piles of chalk dust to locate the center of the hole to be drilled. It is usually a good practice to check the accuracy of the location of the nodes by repeating the process a second time. Because of the varying locations of the nodes, the drawing does not locate the placement of the tone bar mounting brackets.

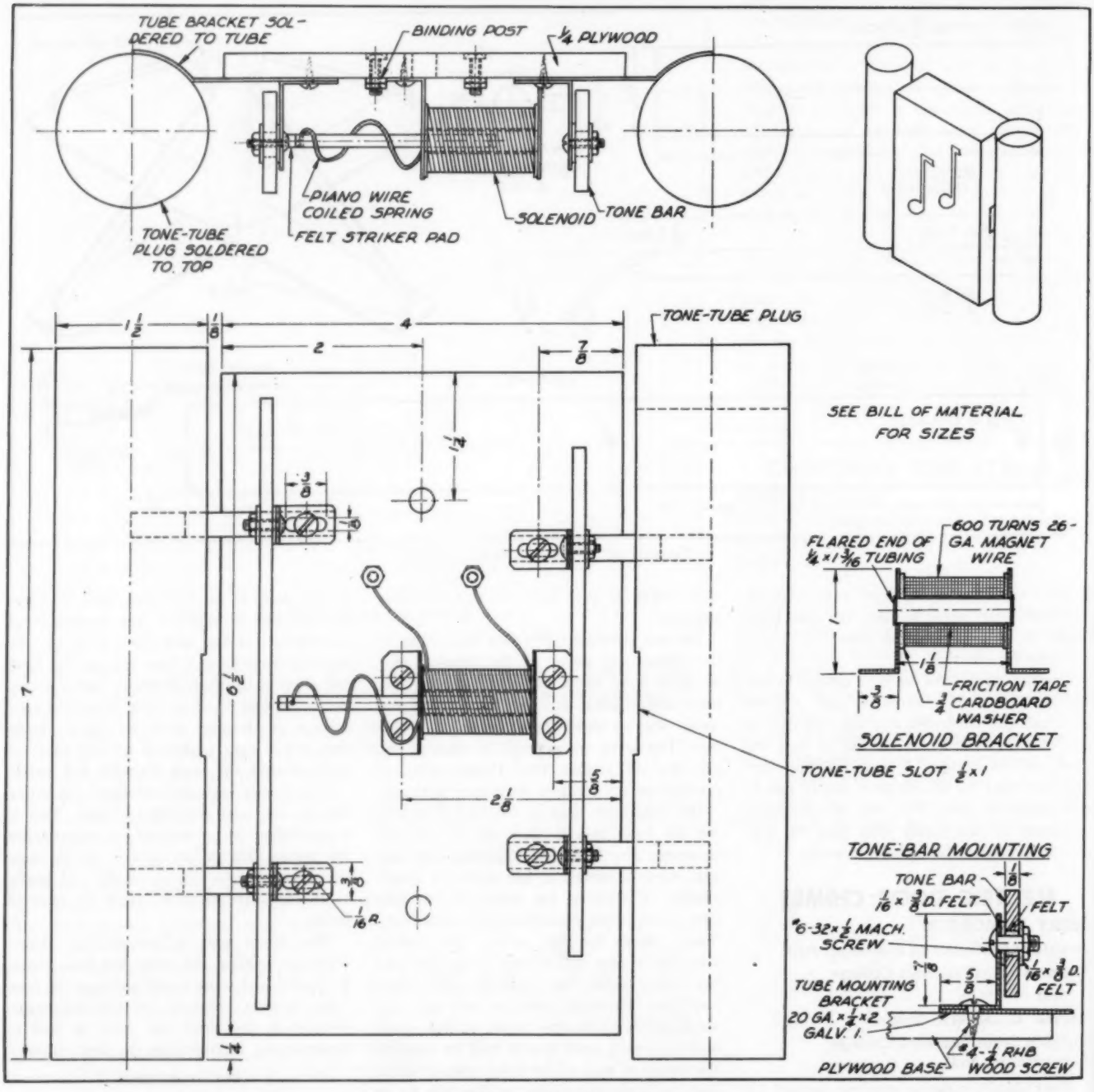
The tone tube is very important in the functioning of the chimes. It is the tone tube that provides the vibrating air column needed to amplify the ring of the metal tone bar. Therefore, the slots on the side of each tube must be mounted opposite the point at which the striker hits the tone bar. Adjustment of the tone is accomplished by adjusting a plug up and down in the tone tube until the most pleasing tone is obtained. The recommended construction of the tone tubes is to cut the required metal from a large tin can and bend and solder it to shape. However, should facilities be lacking to shape and solder the tone tube, a satisfactory substitute can be made very easily from cardboard mailing tubes of approximately the same diameter and length.

It is usually necessary to adjust the spring tension for each individual striker. This is accomplished by stretching or compressing the spring. The return stroke should cause the second bar to ring as clearly and loudly as the first bar which is struck by solenoid action.

The chimes may be finished very attractively by painting the cover box with aluminum paint and using a gold paint on the tone tubes. Initials, carefully cut out and sweat-soldered to the cover box, may be used to decorate and individualize the door chimes.

BILL OF MATERIAL

No. of Pieces	*Name*	*Material*	*Size*
1	Base	Plywood	¼ x 4 x 6½"
4	Tone bar bracket	Sheet metal, 18 ga.	⅜ x 1⅜"
4	Bracket mounting screws	Wood screws	¼" No. 4 RHB
8	Tone bar washers	Felt	⅜" dia.
4	Tone bar hole plug	Felt	3/16 x ⅜"
4	Tone bar mounting screw	Machine screw	8-32 x ½"
1	Low tone bar	Cold-rolled steel	⅜ x 1 x 5½"
1	High tone bar	Cold rolled steel	⅜ x 1 x 4½"



Electric door chimes

2	Solenoid bracket	Sheet metal, 18 ga.	1 x 1⅜"
1	Solenoid	Copper tubing	¼ O.D. x 1 3/16"
100 ft. app.	Solenoid winding	No. 26 magnet wire	600 turns
4	Solenoid mounting screws	R.h. wood screws	¾" No. 4
1	Striker	10 penny nail	2¼"
2	Striker pads	Felt	3/16" dia.
1	Striker return spring	Piano wire	¾" dia. coil
4	Tone tube mounting bracket	Tin can	1 x 2½"
2	Tone tube	Tin can	1½ dia. x 7"
2	Terminal bolts	Machine screws	8-32 x ½"
1	Cover	Tin can	6 x 10"
1	Cover fastener	R.h. wood screw	⅜" No. 2

Procedure

1. Lay out and carefully cut plywood base to size.
2. Sand face, edges, and ends of base smooth.
3. Lay out and drill mounting hole in base.
4. Lay out and drill terminal post holes in base.
5. Lay out and cut tone bars to length.
6. Locate sound nodes on tone bars.
7. Drill mounting holes in tone bars.
8. Lay out and cut tone bar brackets.
9. Lay out and drill mounting holes and slots in tone bar brackets.
10. Bend tone bar brackets to shape.
11. Lay out and cut copper tubing for solenoid core.
12. Lay out and cut solenoid brackets.
13. Lay out and drill solenoid brackets.
14. Bend solenoid brackets to proper shape.
15. Cut cardboard for solenoid washer.

16. Slip cardboard washer over solenoid tube.
17. Slip solenoid bracket over each end of solenoid tube.
18. Flare each end of solenoid tube to prevent cardboard washers and brackets from slipping off.
19. Insulate solenoid tube with one layer of friction tape between cardboard insulators.
20. Carefully and evenly wind 600 turns of magnet wire between cardboard insulators to form solenoid.
21. Shellac or varnish solenoid windings and wrap with one layer of friction tape.
22. Lay out and cut 10*d*. nail to form striker.
23. Lay out and drill return spring hole in striker.
24. Cement felt tips to striker.
25. Lay out and cut tone tubes.
26. Form tone tubes and solder.
27. Lay out and cut plug for top of low tone tube.
28. Solder plug to top of low tone tube.
29. Lay out and cut tone adjustment plug for high tone tube.
30. Lay out and cut tone tube mounting brackets.
31. Drill mounting holes in tone tube mounting brackets.
32. Space mounting brackets on tone tubes to correspond to distances between nodes of their respective tone bars.
33. Solder mounting brackets to tone tube.
34. Shape return spring.
35. Carefully assemble and mount all parts.
36. Connect wires of solenoid to binding posts.
37. Connect assembled door chimes in series with push button switch to 10-14 volt transformer.
38. Push switch to cause striker to sound one tone. Release switch to cause return spring to sound second tone.
39. Adjust tension of striker return spring to obtain uniform sounding of both tones.
40. Adjust parts as necessary for uniform striking of tone bars.
41. Adjust plug in high tone tube until desired tone is attained. Solder plug in place.
42. Lay out and cut cover for chime.
43. Complete cover design and shape cover.
44. Fasten all parts securely and mount cover.
45. Apply suitable finish to tone tubes and cover.

A GOOD SHOP KINK

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Union High School, District No. 2
Burns, Ore.

A crepe sole from an old shoe is a good sanding drum or sanding belt cleaner. Just hold the crepe rubber on the sandpaper while the machine is running.

A USE FOR DAMAGED LINE-COMPOSING MACHINE MATRICES

ROSS STORM
Milwaukee, Wis.

Line-composing machine matrices which, through normal wear, have become unfit for further use are ordinarily not of much value, except for sale to a scrap dealer.

They may, however, be used as a means of identification among the members of the great fraternity of Linotype and Intertype operators. This idea will probably appeal especially to students in the trade and vocational schools.

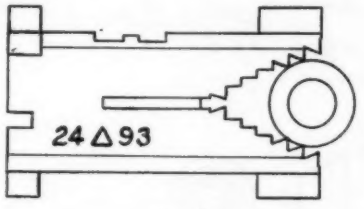

Fig. 1

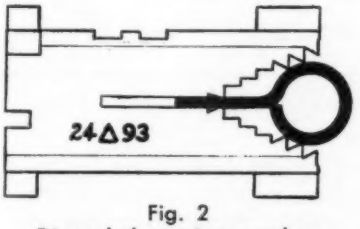

Fig. 2
Discarded matrices used as ornaments

Briefly, the matrices are used as watch fobs, pins, or zipper pulls. One fellow has one mounted on the dash of his car.

There is some preparatory work needed before the item can be considered as finished, but this is easy and of slight cost.

Select a matrix, preferably 18- or 24-point, which is in good condition except for a damaged sidewall. You can select one having your first or last initial. Lay a piece of 400 grit carborundum paper on a flat surface, and by rubbing the matrix on it, polish the ears, toes, bottom, top, and both sides. As a polishing stick for finishing the rest of the matrix, use a piece of flat rule, reglet, or slug with the cloth wrapped around it. This will help to keep corners and edges from becoming rounded. Polish the matrix all over without removing too much metal.

The type of ring used is a matter of choice. Two styles are shown in Figures 1 and 2. They are made of No. 18 B.&S. bare copper wire. Clean the wire and form the loop.

Silver solder the ring to the matrix; at the same time, the gap in the ring is closed with solder. Before soldering, the matrix is coated all over with flux to prevent oxidation. Use a silver solder which melts in the vicinity of 1300 deg. F. to avoid a possible partial melting of the matrix. *Do not* use soft solder, as the matrix will later be plated. If chromium is used, it will be found that it does not adhere to some metals without a base coat of copper. Incidentally, avoid excessive silver solder where the ring joins the matrix as it may form lumps which will later prove impossible to remove.

In the style of ring shown in Figure 2, the straight part is fitted into the bar-point slot in the matrix. It is soldered there as well as where it joins the teeth. A ring like Figure 1 could also be soldered to an ear, or toe, or the bottom of the matrix if desired.

After silver soldering, pickle the matrix in hot diluted sulphuric acid (1 part acid to 15 parts water). Pickle until all traces of flux, dirt, and oxide are removed. Wash in hot water after pickling.

The matrix may now be plated. Gold, silver, nickel, or chromium plate may be used. If you prefer chromium, a satin finish is best, since it does not show scratches and abrasion as does a polished finish. Also, from the standpoint of wear, chromium is best, because it is very hard. If the article is to be plated by a commercial firm, the charge will be moderate. If you want chromium, ask specifically for a *satin* chrome finish. Gold plate will, of course, be more expensive.

To mount the matrix as a watch fob, use a strong silver jump ring on each end of a short piece of chain. Only one ring is needed to attach it to a zipper pull.

It is relatively simple to mount this item on the dash of an automobile. Instead of a ring, solder the matrix to a 6-40 machine screw (brass), with the head filed flat. It is soldered head down. Drill a hole in the dash at the desired location with a No. 33 or 34 drill. Tap this hole with a 6-40 tap. Turn the screw, which is attached to the matrix, into the hole. It may be necessary to use a thin washer on the screw so that when the matrix is screwed down tight against the dash it will be in the desired position.

To make a pin out of the matrix, silver solder a pin back to one side of the matrix. Remove the pin proper before soldering, and do not replace it until finishing and plating are completed.

CENTER DRILL SLEEVE

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and
G. A. HUMMEL
Allegany Trade School
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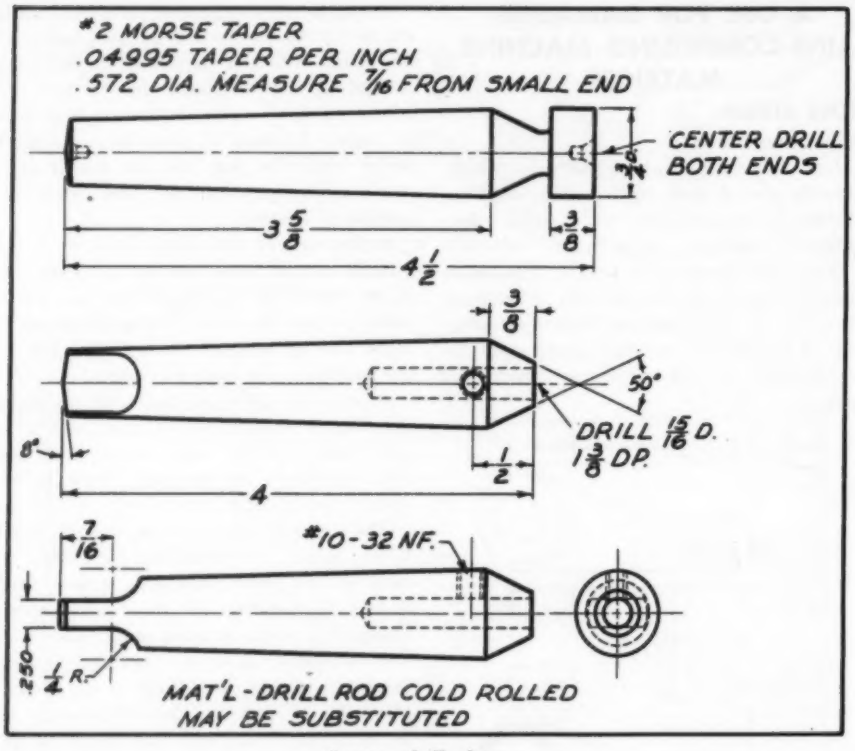
We are often faced with delays on the job in the school shop due to a shortage of drill chucks. A chuck may only be needed long enough to center drill a job, but it is tied up on other work. A center drill sleeve



Center drill sleeve

such as the one detailed in this article will serve that purpose, freeing the drill chuck for other jobs.

This sleeve can be made with any number Morse taper shank to fit the various sizes of lathe tailstocks or drill press spindles found in the shop, or can be made with a No. 2 Morse taper having a tang milled or ground on it so as to be used in a drill socket. The size of the hole may also be varied to fit different size center drills.

As well as being a useful tool, this job also gives the student very good practice in taper turning. If the shop is so equipped it could be made of tool steel or drill rod, hardened and ground to give the student practice along those lines while at the same time doing a project that can be put to use in the shop.

The sleeve detailed has a No. 2 Morse taper with a tang ground by hand so it can be used in a drill socket. The drilled hole will take a D1 size center drill.

Operating Steps

1. Place ¾ o.d. by 4½ stock in three jaw chuck, face and center drill both ends.

2. Use center in headstock with faceplate, or turn center in chuck. Turn one end to true up and cut at 25 deg. for clearance while cutting taper.

3. Reverse stock and cut taper with taper attachment or by offsetting the tailstock. (If job is to be hardened and ground allow .020 for grinding.)

4. Cut 8-deg. taper on end.

5. Place work in headstock of lathe and drill with a 15/64-in. drill. (This may be changed to fit different size center drills.)

6. Finish 25-deg. angle on end.

7. Remove work, drill and tap for a No. 10-32 setscrew.

8. If the sleeve is made with a tang, the job may be done on the vertical mill with an end mill, or a horizontal mill, or it can be ground by hand.

STANDARDS OF CONDUCT FOR SAFE MACHINE SHOP

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High School
Bristol, Conn.

The twenty general safety rules, called Standards of Conduct for a Safe Machine Shop, may be used in various ways in developing a safety consciousness in the machine shop. They are all phrased in positive terms — they tell what to do rather than what not to do. They may be used as a set of general rules with which to start instruction in safe practices. They are helpful as the basis of a review or summarizing discussion.

1. Work quietly at the place assigned to you. Loud talking, laughing, whistling, or horseplay may distract someone else who is operating a machine.

2. Move about the shop, when necessary, quietly but without running.

3. Wear an apron, coveralls, or a shop coat at all times. Your apron should always be tied in back with cotton ties, not with rawhide or wire, or the like.

4. Remove your sweater before starting to work.

5. Roll up your sleeves neatly above the elbows.

6. Remove rings, wrist watches, and identification bracelets.

7. Remove your necktie or see that it is securely tucked inside your apron.

8. If you are ill, report it to your teacher at once.

9. Report any accident, however slight may have been the injury to yourself or damage to equipment or work.

10. If you think that the shop needs fresh air or more light, report the fact to your teacher or the safety foreman.

11. Use tools for the purpose for which they are intended.

12. Hand tools to other pupils. A tool or material that is thrown may injure the pupil who is expected to catch it or some other pupil who does not see it.

13. Operate only machines that you understand. If you have any doubt about an operation, get help from your teacher.

14. Stop your machine if you have to leave it.

15. Stop your machine to oil it or to make any adjustment of the work or cutter.

16. Disengage all feeds and loosen the belts when you finish using a machine.

17. When you finish work, clean up your machine, first with a chip brush and then with waste. Put the waste in the can marked "Oily Waste" when you are through with it.

18. Perform any special duties that are assigned to you so as to eliminate confusion and loss of time.

19. Wipe up spilled oil and cover the spot with Sol-Speedi-Dri.

20. Pick up anything you drop on the floor before you or someone else trips or slips on it.

STENCILSCOPE

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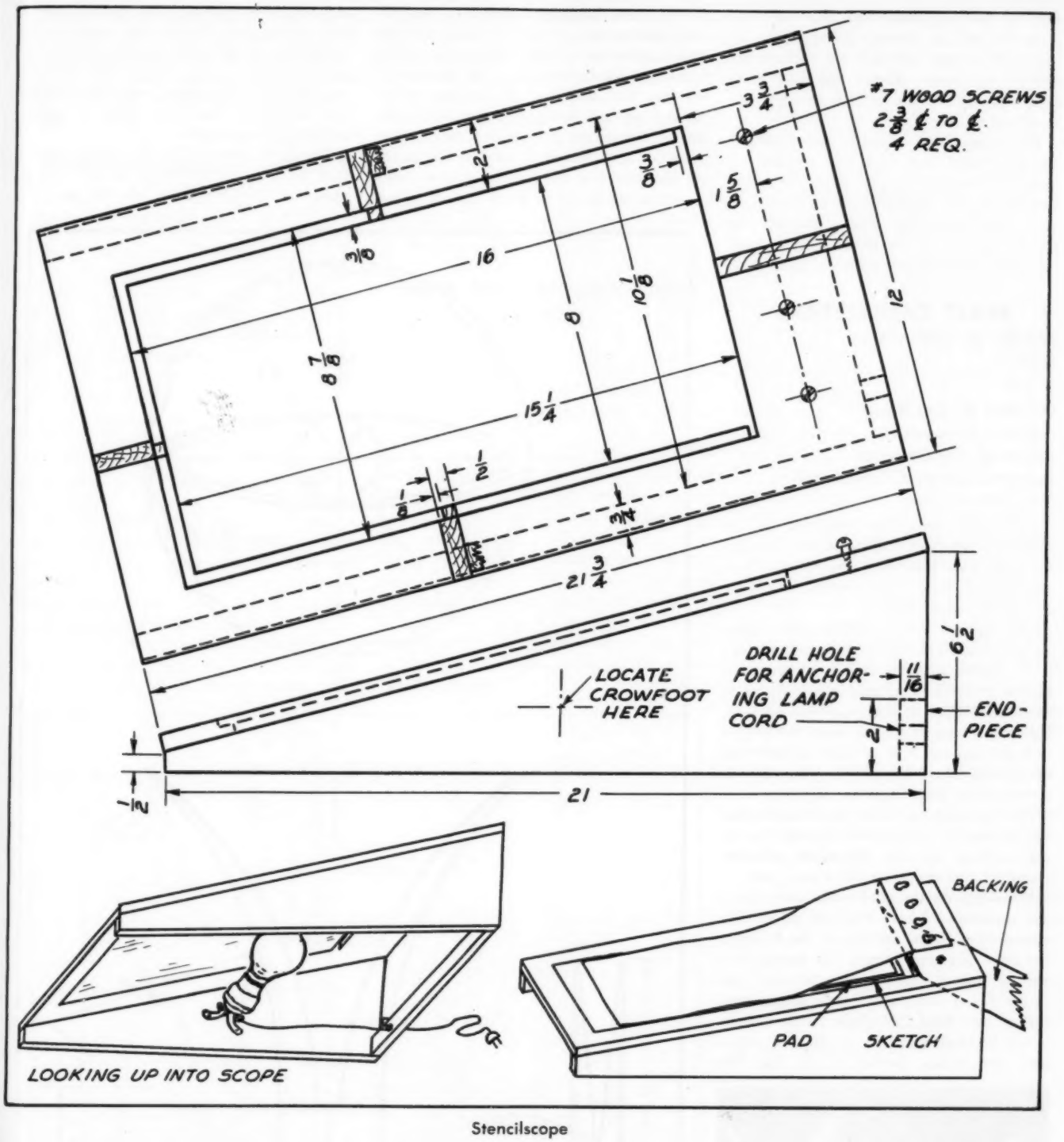
There is no doubt that the availability of any device is directly proportional to its use. Several portable stencilscopes in a school would be a large factor in making possible mimeographed illustrations, and, consequently, better teaching. By its use sketches may be traced on the stencils more easily.

The scope shown here is very simple in its design, and because it is a mere skeleton, it is extremely light, yet no essential feature is lost.



Stencilscope

The two 21-in. sides support the sloping top. The 2-in. end piece provides rigidity. A piece 8⅞ by 16 in. is cut out of the top, and a ⅜ by ⅜-in. strip is placed on three sides around the opening. These strips support the 8⅞ by 15⅝-in. ground glass. Note that a ⅛-in. space is left between the ground glass and the wood at the upper end. When the scope is in use, the stencil backing is pushed down through this slot and out the back of the scope.

A piece of ground glass is placed in the frame with the ground side down. If valve-grinding compound is rubbed between two sheets of window glass, both pieces of glass will be ground.

At the top of the scope are four screws spaced 2⅜ in. center to center. These screws are designed to anchor the stencil in place.

An electric key socket is attached to the inside of the scope by means of a crowfoot. The electric cord is taken out at the end and tied to the end piece; this avoids a strain being placed on the socket. A 50-watt bulb will provide ample light.

The stencil is placed on the scope in the following way. First, fold the stencil back-

ing on the perforated line near the top. Draw the backing through the slot near the top of the scope, and then out through the end of the scope. Anchor the four holes near the top of the stencil on the four wood screws.

The sketch to be traced is placed directly on the ground glass and held by drafting tape. A stencil writing pad is placed on the sketch, and the stencil is placed on top of that. The light then shows through the sketch, the pad, and the stencil, and the tracing of the sketch on the stencil is easily done.

BRASS CANDLESTICKS

ROBERT W. SAMUELSON
Student
and
WILLIAM D. CHATFIELD
Assistant Professor
Industrial Arts Education
Teachers College of Connecticut
New Britain, Conn.

The brass candlesticks described in this article are relatively easy to make by a person with very little shop experience. These candlesticks have considerable take-home appeal for the student.

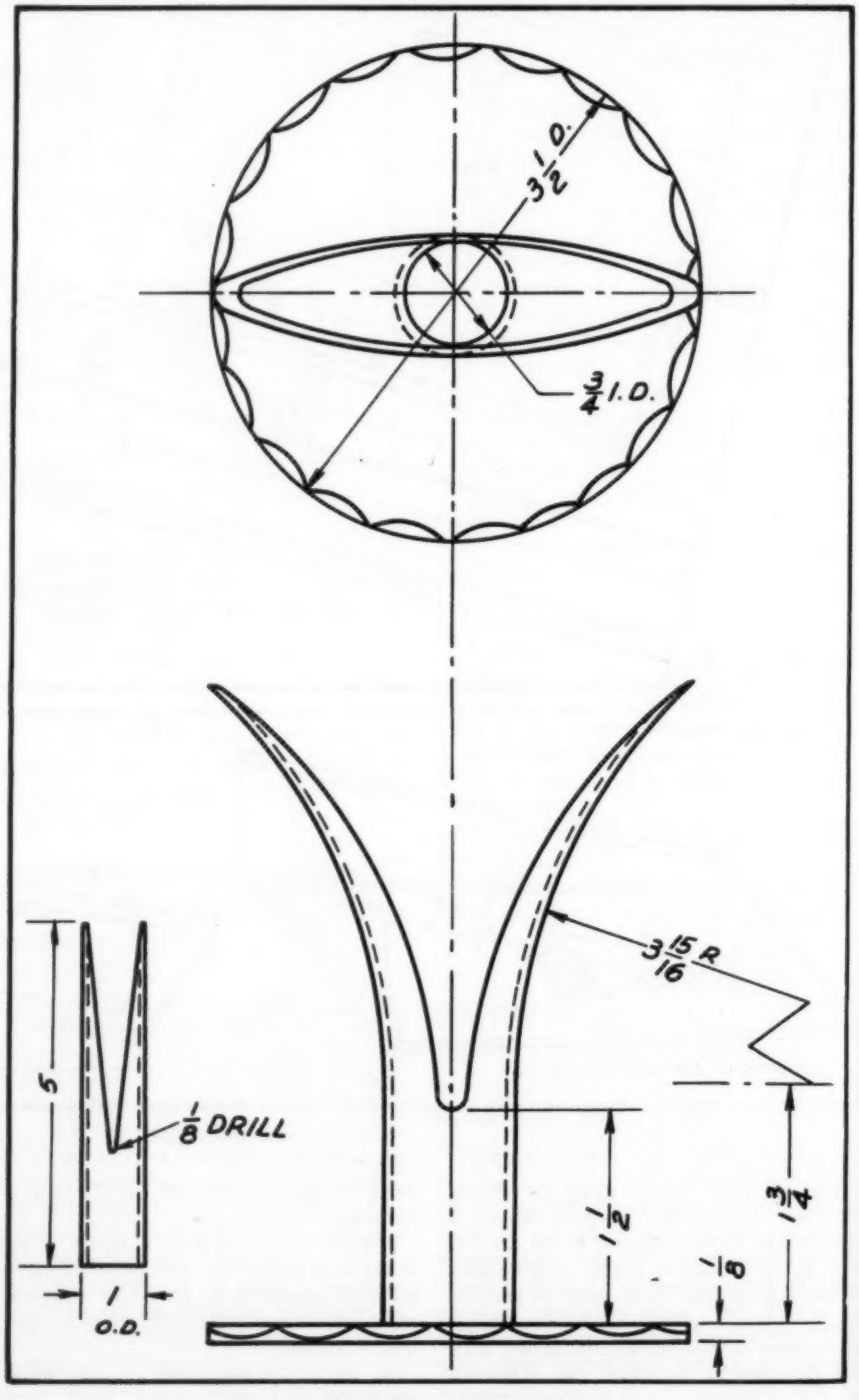
The material used in making the candlesticks is brass. The stem is made of brass pipe ¾ in. outside diameter and 5 in. long. The base is made of ⅛-in. brass plate, 3½ in. in diameter. Copper or aluminum may be used, but if aluminum is used it might be best to drill and tap the base so that the stem can be screwed into it instead of soldering it as is done when using brass or copper.

For the beginning student these candlesticks can be used as a means of learning how to use the hack saw, file, the engine lathe for facing off, and how to solder a butt joint.

When making the candlesticks there are a few suggestions I have that will aid in their construction. Before cutting out the *V* slot in the brass pipe for forming the leaves, it is well to make a paper templet the exact size of the *V* slot and glue it in the proper position on both sides of the pipe. If this is done, it will be much easier to cut the slot with a hack saw without getting off the line. The leaves of the candlestick should be bent before soldering the stem to the base. This can best be done by making a jig out of a wood block with a hole bored in it the diameter of the pipe. The contour of the bent leaf is then worked out and fastened to the block. The pipe is then placed into the hole and the leaf is formed over the jig without making marks on the metal that are hard to remove. When soldering the candlesticks, it will be found that soft solder will do a fine job and give a very strong joint. To do this soldering, tin the bottom of the stem and then sweat it to the base using a torch to heat both the base and the stem. This gives a very clean looking joint and if not too much solder is used it will hardly be noticeable.

The facing operation on the engine lathe is used in truing up the bottom of the stem in order to have a tight fit on the base for

Brass candlesticks



Details of brass candlestick

soldering. Before assembling the two pieces, buff and polish both of them as it is hard to do this after the assembly has been made.

There are many variations possible, as to size and style, when making these candlesticks.

IMPROVED HERMAPHRODITE CALIPERS

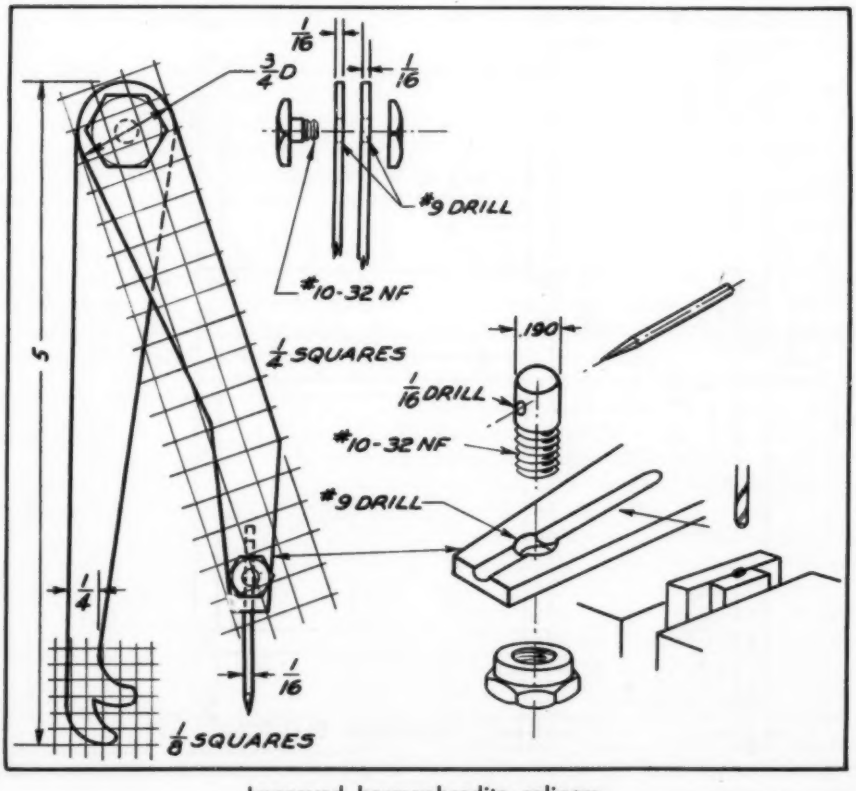
PERCY W. BLANDFORD
Stratford-on-Avon, England

The common odd-legged caliper is a useful general-purpose marking-out tool, but the beginner often finds difficulty in preventing wobble when using it for scribing lines parallel to an edge. The bent leg slides up and down the side and the resulting line is wavy. To prevent this, a stop in the form of a second bent point can be located near the other one. This rests on the top surface and the original point against the edge, giving firm guidance when the tool is drawn along the metal.

An extra point can be brazed or welded to an existing caliper, but the drawing shows how to make a complete caliper. This has proved to be an attractive project in the metal shop, as the student realizes that it is a worth-while addition to his own tool kit.

Make from bright 1/16-in. steel sheet, cleaning up and rounding all edges. Turn the screw and nut from 1/2-in. hexagonal bar. The scriber is a piece of hardened and tempered 1/16-in. rod. Its locating groove is made by clamping a piece of scrap metal to the caliper leg and drilling down the meeting line with a 5/64-in. drill.

An attractive finish can be given to the two legs by spotting them all over before assembly, using a 1/4-in. hardwood rod in the drill press. Load this stick by dipping frequently into a tin of grinding paste, and pressing it onto the work to form a pattern of polished rings.



Improved hermaphrodite calipers

HOW TO KEEP DRAWINGS CLEAN

WILLIAM WEIGL
Toledo, Ohio

A point often stressed but seldom taught in a mechanical drawing course is that of keeping drawings clean.

One cause of dirty drawings is the distribution of graphite dust on the *T* square and triangles and consequently on the drawing itself after a pencil has been sharpened on the sanding pad.

A simple device for cleaning graphite dust from pencil points which have just been sharpened is shown in Figure 1. It consists of a 1/4 by 1 by 1-in. wooden block. The exact size is not important, but the smaller the piece is kept, the less room it will occupy on the drafting table.

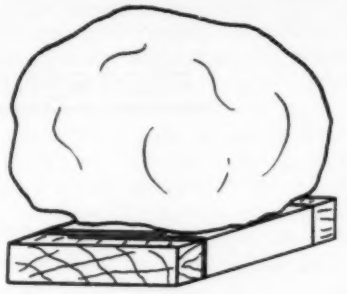


Fig. 1. Pencil-point cleaner

Around this block of wood, wrap a piece of drafting tape with the gummed edge outward, making sure to overlap the ends. Then take a small ball of cotton or similar material, and simply stick it to the tape on one side of the block.

The other side of the block can be fastened anywhere on the drawing table by virtue of the sticky side of the tape being outward from the block.

When a pencil point has been sharpened on the sanding pad and is full of graphite dust, merely stick the point in the cotton, give it a few twists, and it will be clean.

Another way to help keep drawings neat is to have erasers absolutely clean. A dirty eraser will make smudge marks which are quite often hard to remove. Erasers can be kept clean and also sharp by sanding them on a sanding pad. It is very convenient to keep a separate sanding pad just for cleaning and sharpening erasers.

There are other methods of making clean drawings, but experience has proved that a clean pencil point, clean erasers, clean hands, and clean equipment will solve most problems of neatness.

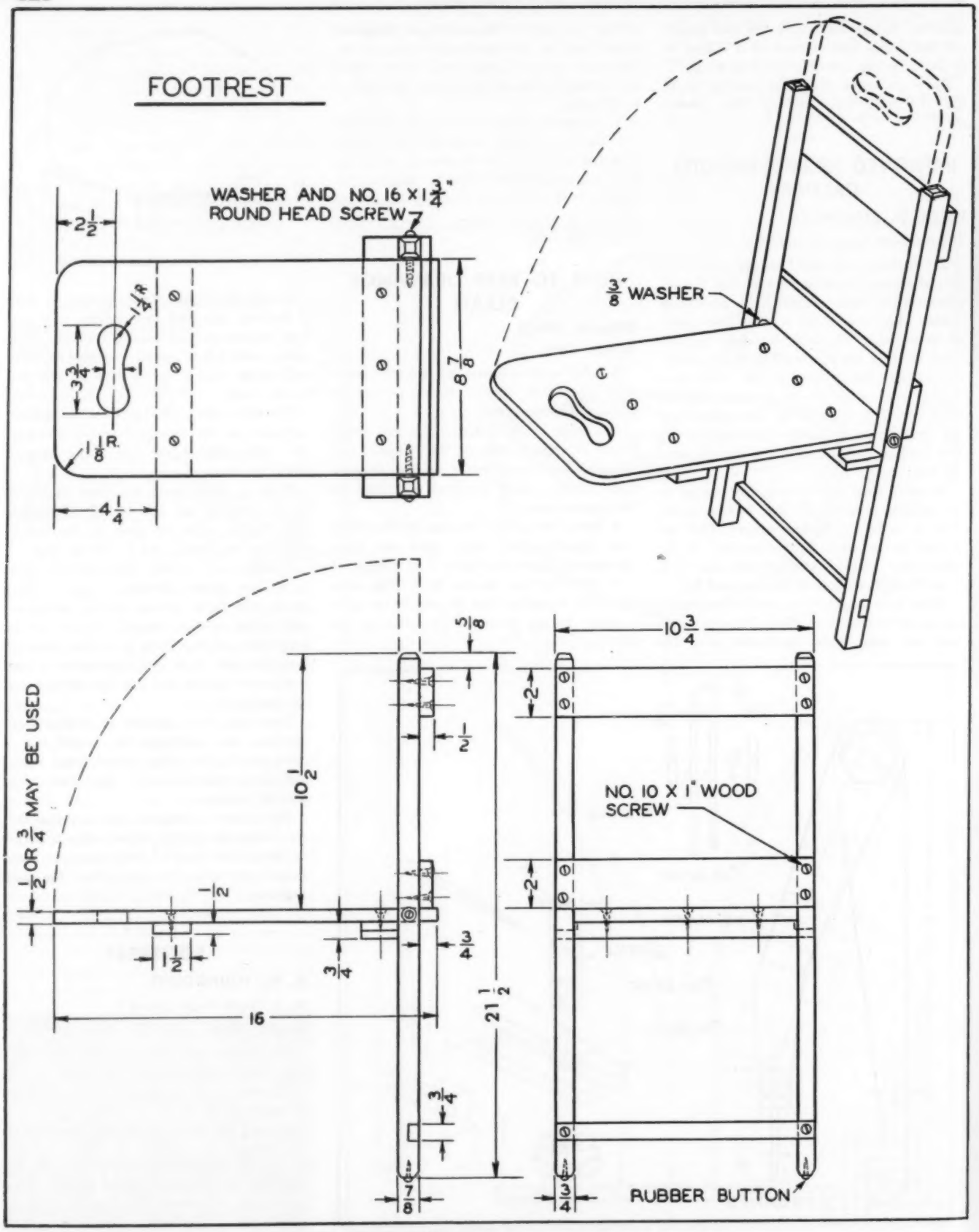
The ability to produce neat drawings will come naturally to the student after a period of time, but how to keep drawings clean should be taught to him from the very beginning.

FOOTREST

A. M. YOUNGQUIST
M. R. Waite High School
Toledo, Ohio

The English footrest illustrated here is a popular, easy-to-make school shop project, as well as a practical and comfortable article to use. It adjusts itself to any individual seated in a lounging chair and folds up for easy carrying and storage.

The drawing shows the very simple construction. It is a particularly good problem for accurate assembly. Almost any kind of wood may be used and any standard finish to suit the owner's taste may be applied. The leg



Footrest submitted by A. M. Youngquist

Novel footrest

board can be covered with Textile Leather, or a similar product, slightly padded, but this is not essential.

USES AND METHODS OF HANDLING INDUSTRIAL DIAMOND TOOLS

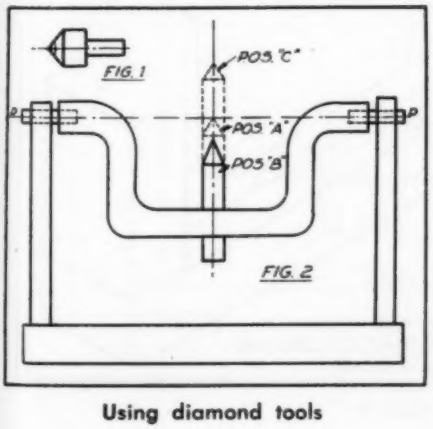
HARRY L. STRAUSS, JR.
National Diamond Laboratory
New York City, N. Y.

Before the last war, industrial diamonds had not assumed the recognition they deserved; possibly because there had not been enough interchange of knowledge on this subject.

The purpose of this article is to offer to the shop instructor, student, and all interested parties, some background technique and uses for the industrial diamond tool. Strangely enough, there are more uses for industrial diamonds than one would imagine on first thought.

Below the author lists the many uses for diamonds and a general discussion on same.

Diamonds are used as: (1) wheel dressers (straight), (2) wheel dressers (radius), (3) wheel dressers (thread grinder), (4) turning tools, (5) scribers, (6) wheels (containing diamond powder), (7) hones (containing diamond powder), (8) dies.



Using diamond tools

In describing the diamond, one would say it is a hard, brittle material. It is composed of one of the three allotropic forms of carbon; namely, soot, graphite (crystalline), and diamond, a crystalline material with an almost hexagonal lattice structure. Diamonds will not oxidize readily at high temperatures. It is inert in all common reagents. It is last on Moh's scale of hardness given as follows:

	Hardness No.	*Tests*
Talc	1	Scratched by fingernail
Gypsum	2	
Calcite	3	
Flourite	4	
Apatite	5	
Feldspar	6	Scratched by feld
Quartz	7	
Topaz	8	
Corundum	9	
Diamond	10	

1. Straight wheel dressing tools as shown in Figure 1 are used to dress and make grinding wheels parallel with the work. The action is one of breaking and tearing abrasive particles which have become dull. It also frees the wheel of load up, or particles of grinding material or dirt that has been forced into the wheel.

To dress a wheel, one must use care not to jam the diamond into the wheel. Advance the diamond on the wheel at the approximate high spot, and feed in until contact has been seen, felt, or heard. Then make as many traverse cuts as necessary at no more than .003 in. per pass.

If a very high finish is needed, make a few passes over wheel without taking any cut, or if the diamond is dull, use same, taking cut of .0005 per pass. A sharp pointed diamond leaves the work with a somewhat matty finish. However, it is not good practice to use blunt diamond for general job work, as a sharp diamond leaves a freer cutting grinding wheel, thus cutting production time and reducing the possibility of *burning* the work or causing grinding checks.

2. Diamonds intended for radius dressing are usually either lapped to a cone or chisel edge shape. That is to say, they are lapped or ground by the vendor to a 60- or 90-deg. cone, or a 60- or 90-deg. concentric bevel on either side of the wedge.

These tools are used in radius dressing fixtures, which all follow the principle shown below in Figure 2.

When the diamond is in position *B*, and if it were to be swung on the axis *D*, it would cut a convexity in the grinding wheel. If it were in position *C*, it would be above center and cut or generate a concavity in the grinding wheel. In position *A* there would be no cutting action as the diamond would be neither above nor below center. Therefore, with this simple fixture, a micrometer, and a set of feeler gauges, it is possible to establish the diamond *so many* thousandths below or above center, thus generating almost any desired radius required.

3. It is doubtful if any vocational shop instructor will be concerned with the thread grinder, not through lack of interest, but rather because of the absence of such a machine in his shop. Therefore, let the author suffice to say that the thread grinder requires a very small sharp diamond which is usually set in a fixture containing two to three such dressers and which will feed forward in a manner corresponding to the desired thread form.

4. Turning tools are lapped diamonds used for cutting abrasive or draggy acting materials. However, for purposes of demonstration, the diamond chips can be obtained at a very low cost and used with great success as a lathe tool. It should be added that these diamond chips can be held in a suitable mechanical fixture.

5. Diamond scribers can be used on hardened steels, glass, and for very fine accurate work where no other pointed tool will stand the usage.

6. Wheels containing diamond powder are used for cemented carbides, glass, and ceramics.

Diamond wheels contain diamonds powdered to a suitable degree of fineness for grinding purposes.

There are three main types of bonds: namely, metal, resinoid, and vitrified.

Metal bonds are best suited for schools where careless use is possible. Metal bonds do not cut as freely as other bonds, and they load quicker; also they are hard to clean. But, for the above stated reason, and no other, metal bonds would be preferred for school use.

The vitrified bond is nearest to metal and is also an excellent all-purpose wheel.

The resinoid bond usually cuts more freely, and is easier to keep clean. However, it is more subject to wear and will be ruined easier than the afore-mentioned bonds.

7. Diamond hones are used in conjunction with cemented carbides. They are essential touch-up tools on tool bits made of super hard materials.

8. Diamond dies will only be encountered in textbooks. Therefore, they can briefly be described as a super hard drawing die material for fine wires varying from .0004 to about .060 diameter.

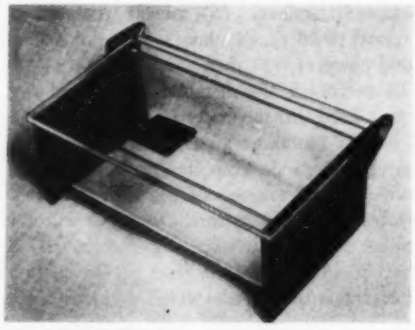
These dies resemble a steel or carbide die, the only real difference being the material from which they are made.

Motor fuel accounts for 43 per cent of U. S. consumption of oil products. — *Petroleum Newsnotes*

PLASTIC BOX

JOHN A. CAREY
High School
Santa Cruz, Calif.

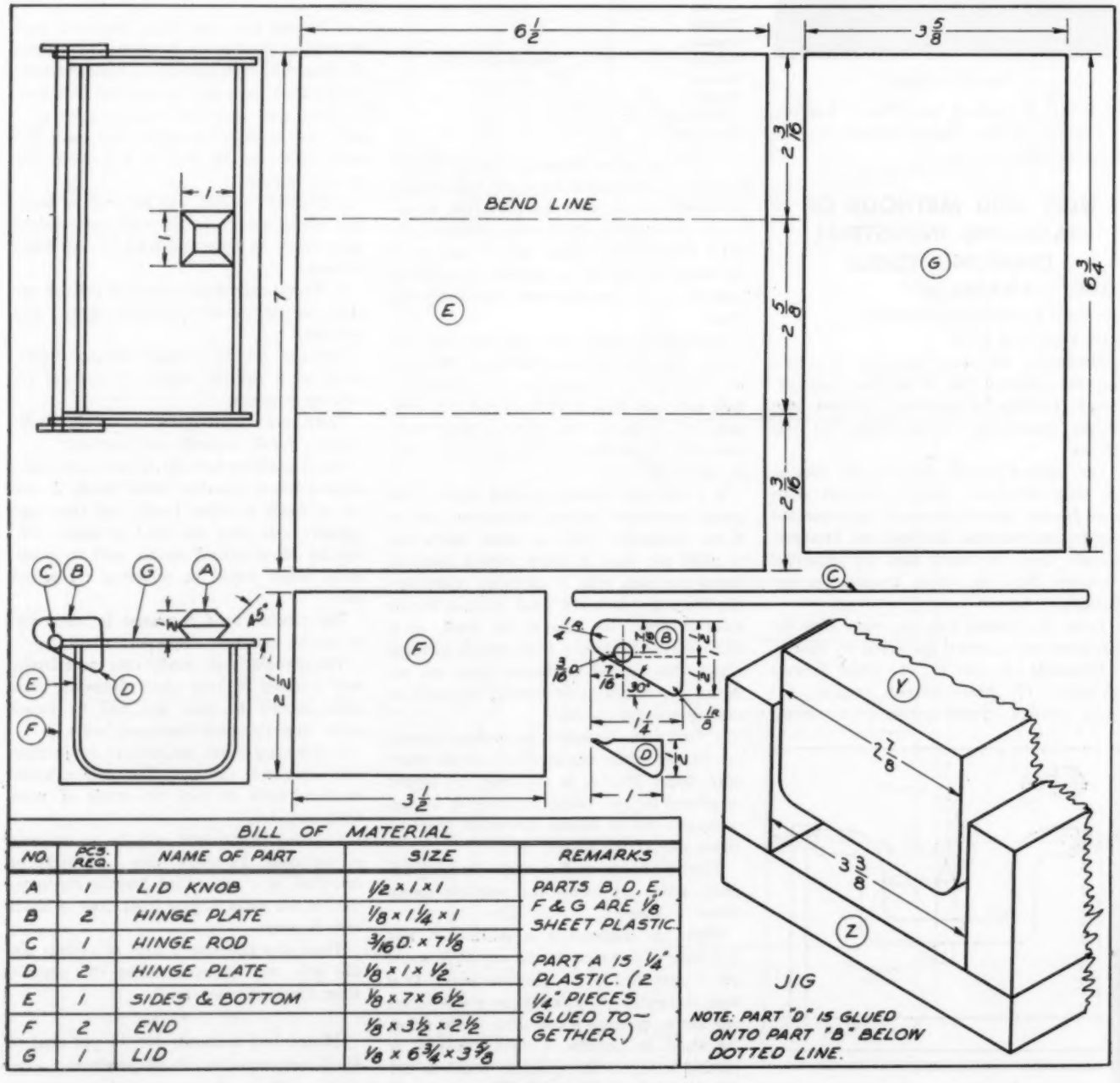
Plastic projects that are simple, attractive, and that entail learning processes are most difficult to find. The plastic box described herewith, has proved to be appealing to students and adults alike. It was assembled by a student who had enrolled in a beginning plastic class at the Santa Cruz High School. The drawings were made by a fellow student in the mechanical drawing class.



Plastic box by John A. Carey

The box completed two of the required elementary operations in the use of plastics, which were assigned to all students; to heat and bend and to facet cut. However, it is obvious that other operations were performed, such as: to plan, design, measure, square, saw, file, sand, drill, polish, glue, bevel, clamp, assemble, sketch, and make a bill of materials.

The appearance of the box is enhanced by the use of colored plastic for the ends *F;* hinges *B* and *D;* and lid knob *A*. The hinge rod *C* could be of any similar diameter, and is cemented to the lid *G*. The hinge was glued



BILL OF MATERIAL

NO.	PCS. REQ.	NAME OF PART	SIZE	REMARKS
A	1	LID KNOB	1/2 × 1 × 1	PARTS B, D, E, F & G ARE 1/8 SHEET PLASTIC. PART A IS 1 1/4" PLASTIC. (2 1/4" PIECES GLUED TOGETHER.)
B	2	HINGE PLATE	1/8 × 1 1/4 × 1	
C	1	HINGE ROD	3/16 D. × 7 1/8	
D	2	HINGE PLATE	1/8 × 1 × 1/2	
E	1	SIDES & BOTTOM	1/8 × 7 × 6 1/2	
F	2	END	1/8 × 3 1/2 × 2 1/2	
G	1	LID	1/8 × 6 3/4 × 3 5/8	

Plastic box

onto the ends with the hinge rod already in place, and is glued after all other operations have been performed. This type of hinge works perfectly and is an improvement over the pin hinge or lift off lid.

The lid knob is made of ¼-in. clear plastic glued together with colored cement. This knob is very attractive and is an excellent project in itself. Other decorative knobs could be made using such procedures and internal carvings and blown half spheres.

The bottom section *E* can be easily glued to the sides by the use of an eyedropper or small brush as glue applicators.

The wooden jig should be constructed by nailing the sides to the base *Z*. Part *Y* of the jig must leave sufficient space on either side to allow room for the hot plastic (280 to 300°) plus a piece of flannel if a very smooth surface is desired.

The sides of the jig must be high enough to support the hot plastic, and with a few variations of the jig other useful and desirable boxes could be created.

The plastic box was planned, designed, and exhibited by Jun Lee, student in Plastic I, Santa Cruz High School, Santa Cruz, Calif.

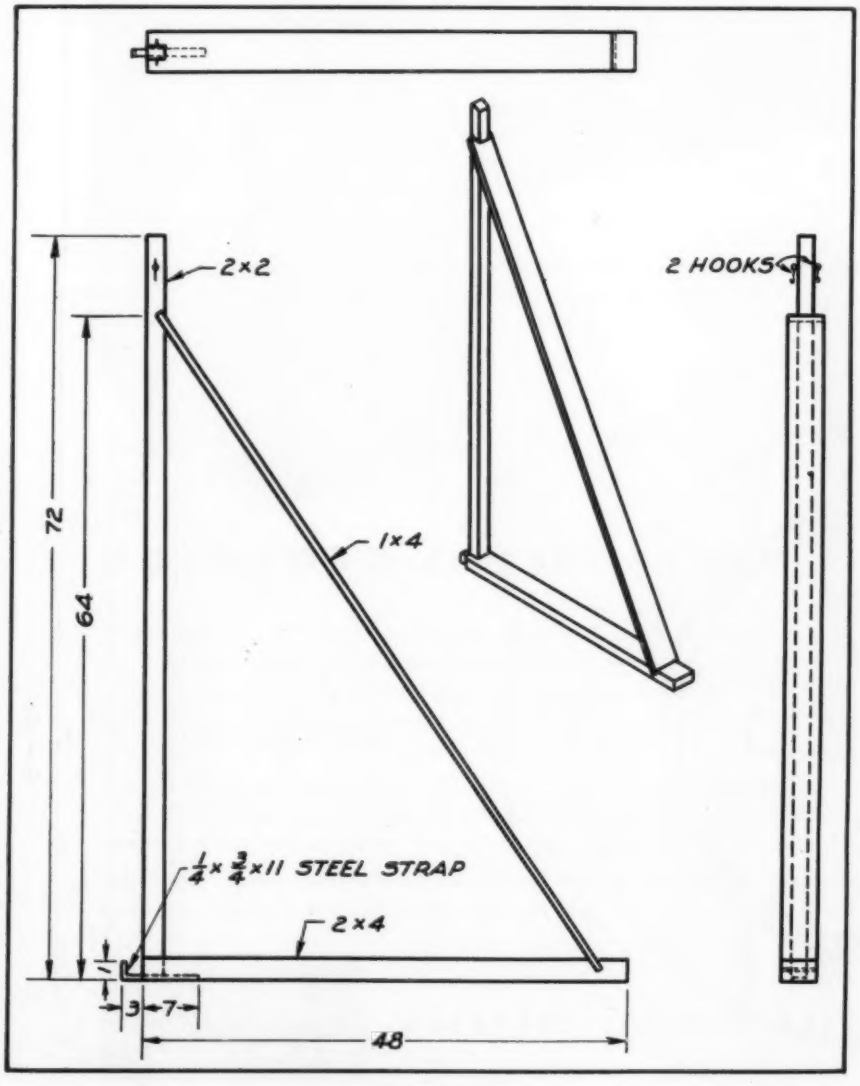
SCENERY SUPPORTS

WILLIAM F. WHITE
and
THOMAS McNULTY
High School
Union, N. J.

Many high school industrial-arts teachers yearly face the task of constructing stage scenery for school plays. On many occasions they may be required to construct three or more different sets, which must be changed quickly and quietly. The support shown here was designed to brace the 10 to 12-ft. high flats that are commonly used, and it has proved very satisfactory. Since we have hardwood floors on our stage, supports cannot be screwed to the floor. Therefore, we place ten to twenty pounds of sand on the foot to keep the supports in place.

First, screw eyes into the flat at the point at which you are going to place the support. Then, lift the bottom of the flat into the steel holder and drop the hooks on the support into the eyes.

These supports are very light and may be quickly and quietly moved to any part of the stage to hold flats at any desired angle.

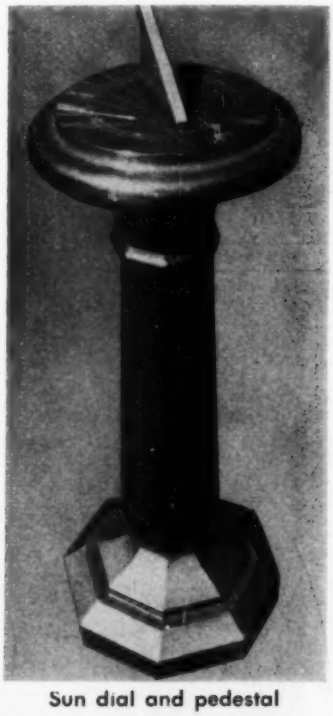


Scenery supports

SUN DIAL AND PEDESTAL

A. M. YOUNGQUIST
Industrial Arts Department
M. R. Waite High School
Toledo, Ohio

The sun dial pedestal shown herewith is a particularly fine project for the drawing

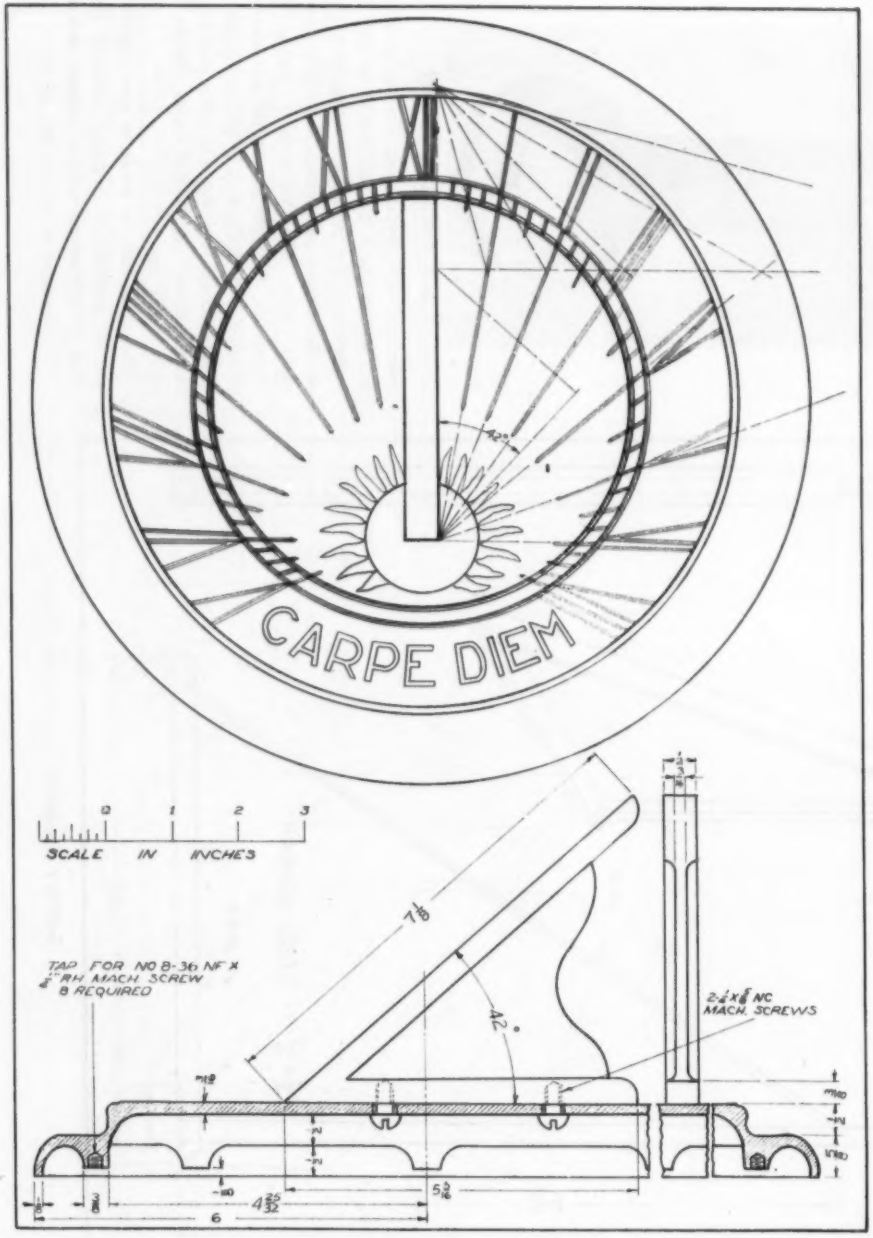


Sun dial and pedestal

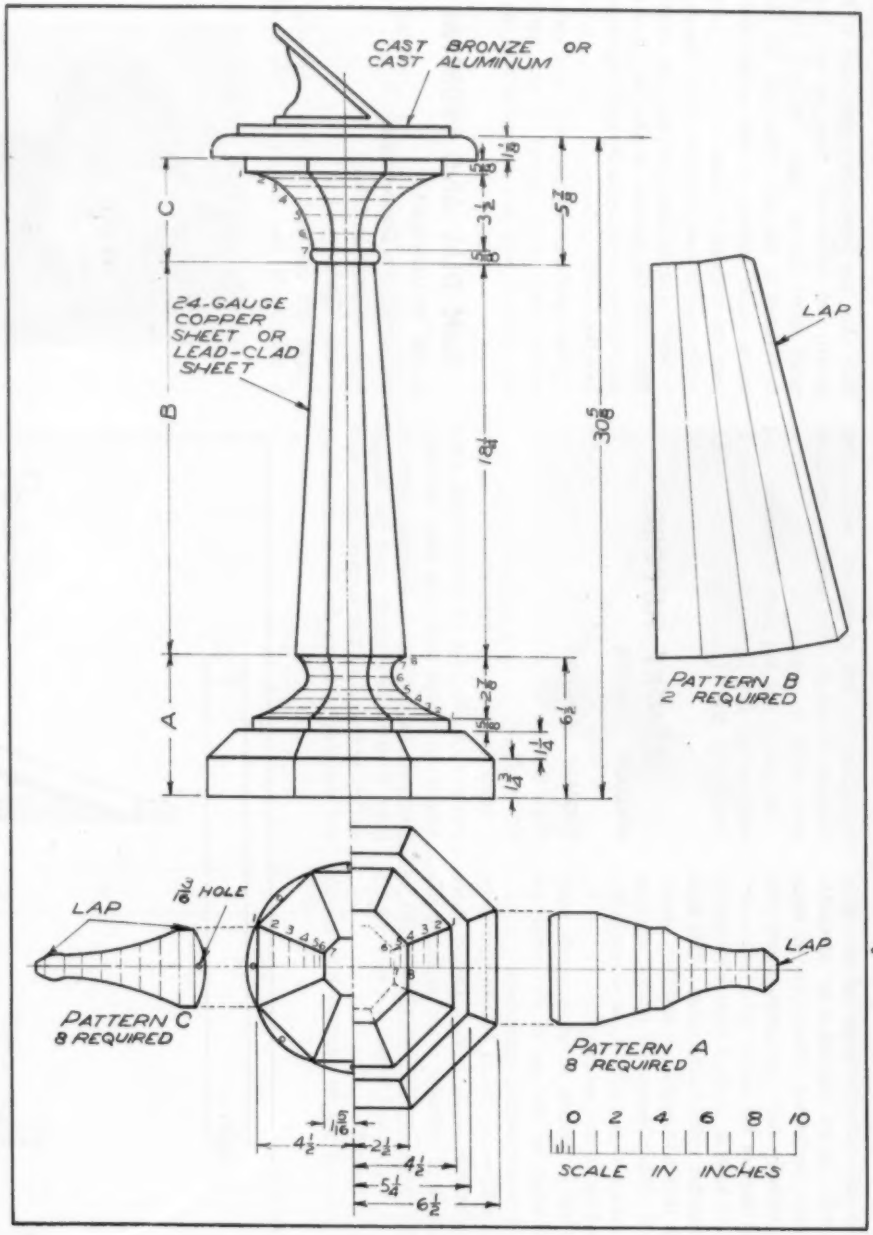
room and sheet-metal shop. The design of the dial was made in the drafting class from the instructions for laying out a sun dial given on the tracing supplement No. 193, INDUSTRIAL ARTS AND VOCATIONAL EDUCATION, November, 1930. Students in the pattern shop, foundry, and machine shop all participated in making the finished dial. The Latin inscription, "Carpe Diem" on the dial means, "Make the most of the day."

Sun dials may be made of cast aluminum and the pedestal of 24-gauge lead-clad sheet steel, or of bronze with a copper pedestal.

(Continued on next page and page 18A)



Sun dial



Sun dial pedestal

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ROCKFORD ECONOMY LATHES – 16″ and 18″

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ROCKFORD MACHINE TOOL CO. • ROCKFORD, ILLINOIS

SUN DIAL

(Continued from pages 323 and 324)

To give greater stiffness and strength a galvanized sheet steel channel extending from top to bottom was soldered inside the column. It is advisable to paint the inside of the pedestal with aluminum paint.

To set the pedestal, a hole about 16 in. deep was dug into the ground, and concrete was poured into it. The pedestal was then set on the concrete even with the ground and more concrete poured into the column from the top and rammed down. Concrete extending about one fourth of the way up inside the pedestal is sufficient to anchor it thoroughly. The dial casting is secured to the flanges on the pedestal top by No. 8 brass machine screws. The instructions accompanying supplement 193 were helpful in placing the dial for correct time.

PERSONAL NEWS

(Continued from page 8A)

♦ DR. CHRIS H. GRONEMAN, head of the industrial-education department of Texas A. & M. College, College Station, Tex., has been appointed editor of "School Shop Safety Newsletter" starting with the October, 1952, issue.

A native of Newton, Kans., he received both his B.S. and M.S. degrees at Kansas State Teachers College. Following graduate study at the University of Minnesota and at Pennsylvania State College, he received the Ed.D. degree in 1950 at the latter institution.

Dr. Groneman's experience includes teaching industrial arts and coaching in the high schools of Mayetta, and Plains, Kans., and Woodward, Okla. At Woodward Junior College he was supervisor of industrial education, director of athletics, and assistant dean.

Entering the Texas scene, he became assistant professor of industrial education at East Texas State Teachers College, Commerce, Tex.; and in 1940 joined the staff of A. & M. College of Texas. He has been head of the industrial-education department there since 1949.

A member of many vocational and teaching associations, he has served as president of the Texas Vocational Association, on the cabinet of the American Vocational Association, and has been a consulting editor for McGraw-Hill since 1949. He serves on the Advisory Committee of the Ford Industrial Arts Awards, and is the author of 12 books on industrial arts and handcraft. His magazine contributions have appeared in INDUSTRIAL ARTS AND VOCATIONAL EDUCATION, *School Shop, Industrial Education,* and the *American Vocational Journal.*

♦ PFC. STEPHEN G. PALMER, youngest son of Dr. H. G. Palmer, head, industrial-arts department, Iowa State Teachers College, Cedar Falls, Iowa, lost his life in Korea, August 30, serving in the infantry in the Mount Baldy area. He left school to enlist to serve his country. Surviving are his wife, Mrs. Stephen Palmer, home-economics teacher in West Burlington, Iowa; his parents; and two brothers — Harold Phillip Palmer, civilian instructor, Aberdeen Proving Grounds, Md., who taught mechanical drawing last year in Burlington, Iowa; and Douglas L. Palmer, former industrial-arts instructor at West Union, Iowa, now in the hardware business at Manchester, Iowa.

♦ DR. CARL E. FRANKSON, chairman of the industrial-arts department, Newark State Teachers College, for the past two summers, has taught both undergraduate and graduate courses in professional areas and technical subjects.

♦ GOODWIN G. PETERSON, for the past five years an assistant professor in the industrial-arts department of San Jose State College, has resigned to launch into a private school venture of his own. Mr. Peterson is interested in the country ranch-type school organized on a twenty-four-hour basis.

♦ A. I. THOMAS has been appointed director, division of Industrial Education, Prairie View A. & M. College, Prairie View, Tex.

The new division is composed of an industrial-arts department, and a vocational industrial education department. The following are members of the staff: L. B. James, Thos. L. Holley, A. G. Cleaver, D. W. Martin, R. E. Bailey, L. R. McNeeley, W. H. Stickney, W. J. Bell, Milson Glenn, W. J. Jollie, S. R. Collins, Oscar Eason, E. J. Johnson, J. L. Wrenn, Luther Mitchell, William McDuffie, Harold G. Washington, Robert Rayford, D. N. Herndon, J. M. Wilson, and J. L. Hill.

♦ DR. JESS E. RATHBUN, co-ordinator of industrial arts for the San Francisco Unified School District, taught a two-week summer workshop in safety at San Francisco State College from June 25 through July 3.

Dr. Rathbun has just retired from the editorship of "School Shop Safety Newsletter," and

(Continued on page 21A)

SHELDON
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above all else in school lathes

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. . . all belts, pulleys, countershafts, gears and motors are completely enclosed. Speed changes and gear-ratio changes are made by external shift levers.

★SHELDON PRECISION
. . . Timken "Zero-Precision" Tapered Roller Spindle Bearings (the absolute in accuracy) permit student work to ten-thousandths of an inch, and hold this accuracy without constant maintenance.

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SHELDON-taught students are ready to operate standard industrial lathes—are familiar with standard controls and the "big lathe feel".

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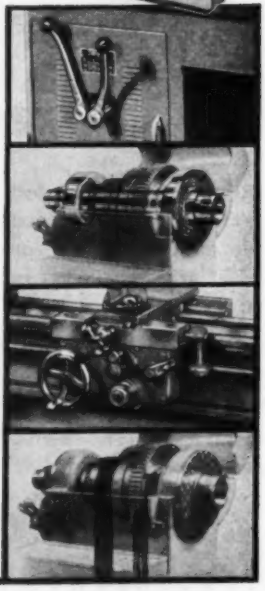

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Inevitably, the success of this new power tool attracted imitators, brought others to the field. In spite of this, Skilsaw, Inc., maintained a leadership which continues to keep it first in the field.

With this remarkable growth came stronger and stronger demand from *all* industry for *other* kinds of power tools built with SKIL Quality, *other* ways to replace muscle with machine and do jobs better, with less work in less time. Skilsaw, Inc., has answered this demand—now offers more than 160 different models of portable power tools, each one an example of the finest engineering and quality in the field—SKIL Quality!

So it is with justifiable pride that we now alter a corporate name we have in simple fact outgrown. Hereafter, the company long known as Skilsaw, Inc., will be known as SKIL Corporation, the name to be remembered in the manufacture, sale and service of portable power tools.

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26 DIFFERENT TOOLS BESIDES SAWS...IN OVER 160 MODELS

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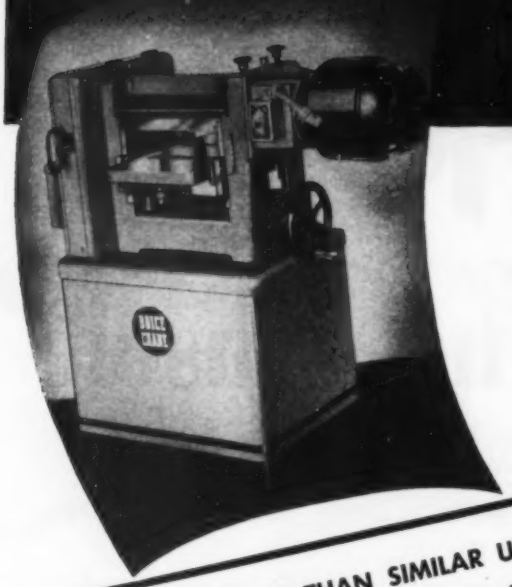

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OVER 50% FASTER THAN SIMILAR UNITS

Powered for output of 14 feet per minute. Has a massive, one-piece main frame and the extra weight bolted-up frames lack for long, accurate service. Thousands of installations date back 15 or more years. Machine Serial No. 1 still operates daily, having planed millions of feet of hard wood.

STEADY, POWERFUL, GROOVED STEEL INFEED ROLL! FINER FEED MECHANISM ELIMINATES COSTLY MAINTENANCE

No troublesome clutches or double-worm reduction gear overly vulnerable to intermittent strains and shocks in feeding stock. Simplified, quieter feed gear fully cushioned against jamb-ups in feeding that cause others to fail. Instant feed control without stopping motor. Power driven rolls in bronze-bushed self-aligning journals — also automatically adjust when work thickness varies — an exclusive feature.

SIMPLE, EASY BLADE SETTING

12¼" x 20" table. Thick walls and exceptionally well ribbed table casting stays flat and true. Two table idler rolls — often omitted in inferior machines.

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Less power required. Choice of 1½ and 2 h.p. direct to cutterhead or V-belt motor, engine or lineshaft drive. Bench or complete floor type units.

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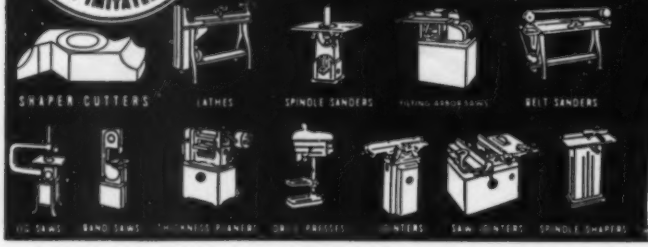
AVAILABLE NOW! . . through industrial supply distributors in most cities. No long waits for delivery. High quality, low cost tools for cutting, shaping, drilling and finishing wood, fibre, metals and plastics.



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PERSONAL NEWS

(Continued from page 18A)

in this capacity secured for readers of the "Newsletter" many items of unusual interest to teachers of shop safety and their classes.

♦ PRICE E. CLARK of Charleston, W. Va., assistant state supervisor of secondary schools in charge of driver education, has been appointed educational director of the Association of Casualty and Surety Companies' accident prevention department.

Clark was one of the nation's first state directors of driver education to set up that subject as an integrated part of the curriculum with a full accredited course. He succeeds the late Merrill C. Yost, who died less than a year after he joined the Association. The new educational director will be assisted by THOMAS A. SEALS, who became a member of the accident prevention department's educational staff a year ago.

♦ Paul Eshelman, instructor of woodwork in the industrial arts department at State Teachers College, Millersville, Pa., served during the latter half of the summer as a demonstrating and producing craftsman on a wood lathe at Old Sturbridge Village, Sturbridge, Mass.

During the first half of the summer, Henry Kauffman, instructor in general metal, worked as a demonstrating craftsman in metalwork at the same place.

♦ SEI SUJISHI, instructor of chemistry at Illinois Institute of Technology, Chicago, Ill., has been promoted to the rank of assistant professor, effective September 1.

Sujishi received his B.S. degree in chemistry in 1946, and his M.A. degree in 1948, from Wayne University. In 1949 he received his Ph.D. from Purdue University.

♦ LOUIS P. ELBINGER, instructor of electrical engineering at Illinois Institute of Technology, has been promoted to the rank of assistant professor, effective September 1.

♦ DR. THOMAS W. MACQUARRIE, a former shop teacher himself, author of the MacQuarrie Mechanical Aptitude Test, a leader in Vocational Education on the Pacific Coast for almost three decades, and for the past twenty-five years president of the San Jose State College, retired August 1, 1952. Dr. MacQuarrie's successor is Dr. John T. Wahlquist, former dean of education of the University of Utah.

♦ JAMES E. STEVENSON of the San Jose State College industrial-arts staff, completed the requirements for the doctorate at Stanford University during the 1952 summer session. Dr. Stevenson's dissertation deals with industrial-arts shop management.

♦ JEROME LEAVITT, formerly at Northwestern University, Evanston, Ill., has been appointed assistant professor of education for the general extension division of the Oregon State System of Higher Education, Portland, Ore.

♦ TRUEMAN T. MILLER, general sales manager of A. B. Dick Company, died August 18 following a prolonged illness.

At the time of his death, Mr. Miller was in his twenty-seventh year of service with A. B. Dick Company, having risen through the ranks of salesman, sales supervisor, branch manager in Pittsburgh and Chicago, and regional sales manager. He was appointed general sales manager early in 1951.

News Notes

♦ Those interested in conservation will find American Forest Products Industries' 1951–52 Bibliography a storehouse of useful information.

The 16-page publication lists a variety of booklets, charts, maps, posters, filmstrips and a motion picture now available for schoolroom use.

Among the educational aids offered this year is a manual specially designed for use by teachers. This manual suggests a variety of interesting ways to incorporate forestry and conservation in regular classroom work.

Also available is a booklet titled "The Story of Pulp and Paper."

Copies of these publications are available on request from *American Forest Products Industries, 1319 Eighteenth St., N.W., Washington 6, D. C.*

♦ A revised 19-page Teaching Aids Catalogue for 1952–1953 is available from the Westinghouse Electric Corporation's School Service Department. Introducing a section on home-lighting pamphlets along with other new classroom aids, the catalogue describes 84 free or low-cost booklets, charts, posters, and other audio-visual aids available to junior and senior high schools.

These aids cover a wide range of subjects including science, social studies, agriculture, home

(Continued on page 24A)

ELIMINATE

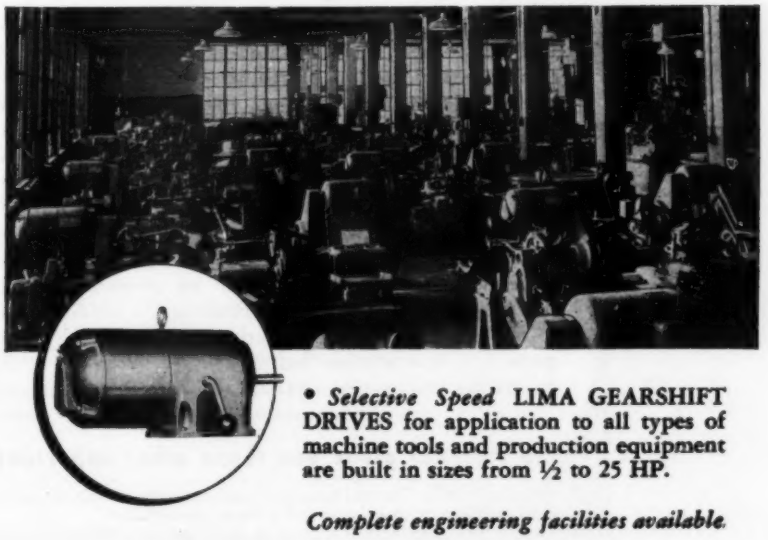
HAZARDOUS

LINESHAFTING

Specifically designed to individually motorize machine tools originally driven by lineshaft, LIMA GEARSHIFT DRIVES were selected by Ohio State University to provide its students with the very best in modern machine shop equipment.

Ohio State is but one of many schools throughout the nation that have modernized their machine shops with LIMA DRIVES, providing the utmost in functional safety, adequate lighting, proper machine location and the complete elimination of hazardous lineshafting.

Ohio State's completely modernized Industrial Engineering Department



• *Selective Speed* LIMA GEARSHIFT DRIVES for application to all types of machine tools and production equipment are built in sizes from ½ to 25 HP.

Complete engineering facilities available

LIMA

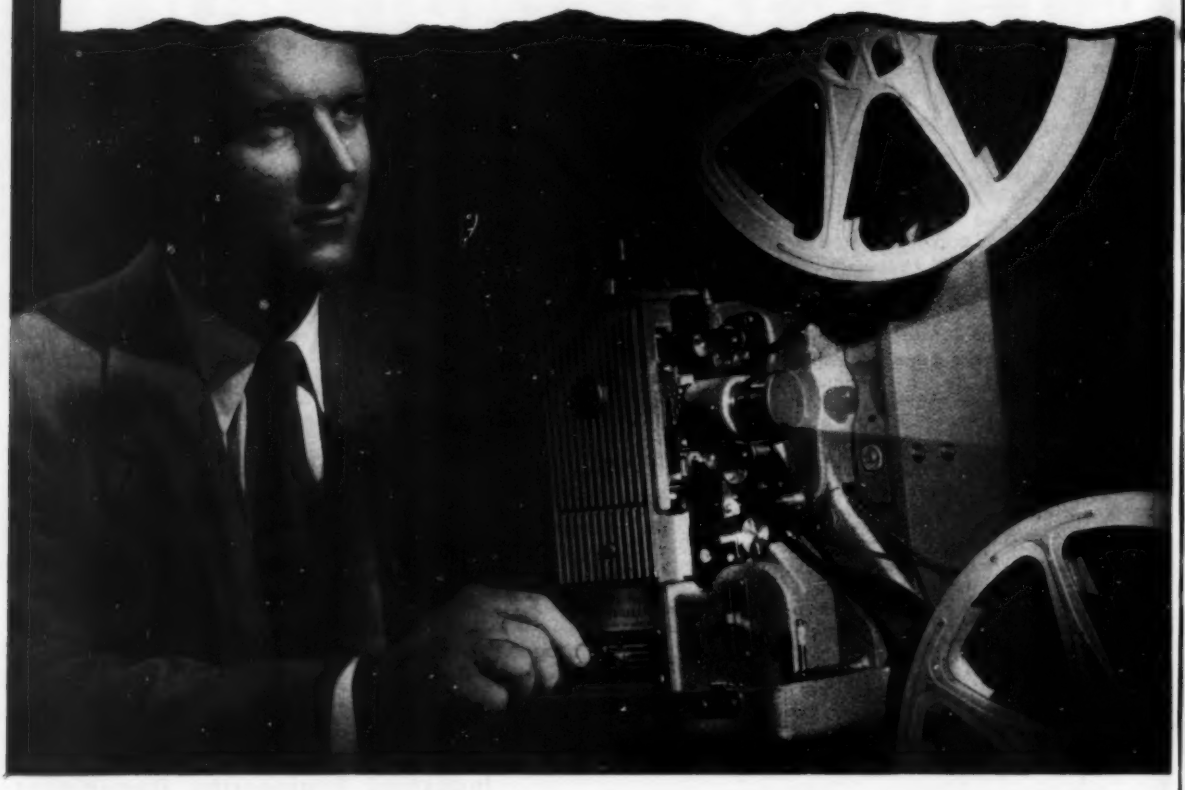
WRITE FOR LITERATURE

Representation in principal cities

GEARSHIFT DRIVES & MOTORS

THE LIMA ELECTRIC MOTOR COMPANY 3451 FINDLAY ROAD • LIMA, OHIO

Read how these A-V experts rate the



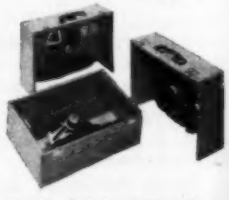
"By all odds, the biggest single-service problem with motion-picture projectors is faulty lubrication," is the opinion of Audio-Visual experts, coast to coast. Too little oil encourages wear. Too much oil gums up working parts, stalls motor, collects dirt, impairs performance.

Recognizing lubrication as a major problem, Kodak engineers set out at the start to design a projector which would eliminate lubrication worries. The result—the sensational Kodascope Pageant Sound Projector with its *permanent lubrication.** Oil-impregnated bearings . . . sealed-in-oil ball bearings . . . "lifetime" oil-retaining pads . . . low-friction nylon gears . . . and a minimum of moving parts, all assure quiet, trouble-free operation—month, after month, after month. You can forget all about lubrication!

Yet, you really have to see and operate this superb new 16mm. sound-and-silent projector to truly appreciate its many unique advantages. Your Kodak Audio-Visual Dealer will be glad to show it to you—either the one-case, single-speaker Pageant for classroom and small auditorium use, or the matched-case, four-speaker Pageant for ideal sound reproduction under difficult acoustical conditions. Or write Rochester, New York, for complete details about the Pageant. List price, $400 with the single speaker, $492.50 with Multi-Speaker Unit. (Prices are subject to change without notice.)

The Pageant gives you these other important advantages, too!

- Built-in Fidelity Control focuses scanning beam exactly on sound track for the finest tone reproduction from *all* types of 16mm. sound films.
- Unique field-flattening element in the Pageant's optical system gives you crisp, corner-to-corner screen images.
- Operation is so simplified that students make excellent projectionists with only a few minutes' instruction.
- Accepts microphone or record-player attachment for use with silent films and also can be used as public-address system.
- Compact, simple to set up, the Pageant can be used . . . carried . . . anywhere on quick notice.



The Kodak Multi-Speaker Unit provides three *extra* speakers which pack into a single, easy-to-carry case.

EASTMAN KODAK COMPANY, Rochester 4, N. Y.

Pageant and its exclusive "P. L."*

"... The main problem in the use of 16mm. sound equipment for schools, churches, industry, etc., is that of maintenance. The primary maintenance problem has been over- or underoiling. The Pageant eliminates this difficulty, making it the most popular in the Audio-Visual field ..."

Amedee J. Maserjian
Arax Photographic Co., Poughkeepsie, N. Y.

"... We finally have the answer to the schoolman's 'breakdown' problem, where sound projectors are concerned, with Pageant's permanent prelubrication! The schoolman cannot fail to oil, or oil too much ..."

W. S. Booth, *Vice-President*
National School Supply Co., Inc., Raleigh, N. C.

"... The Pageant's permanent prelubrication is welcome news to the schoolman. No hourly oil records to keep, no freeze-up from lack of oil, and no 'mess-up' from too much oil ..."

E. F. Burke
Burke's Motion Picture Co., South Bend, Ind.

"... Our experience, based on repair-shop records, clearly indicates that overlubrication or underlubrication is responsible for well over 50% of all projector complaints. This is why we are so enthusiastic about the permanent prelubrication feature of the Pageant. You just forget about oiling!"

W. W. Birchfield, *General Manager*
Alabama Photo Supply, Montgomery, Ala.

"... Our biggest single problem in servicing and maintenance of 16mm. sound projectors in our territory has been under- or overlubrication. This has been a really big problem in the school and instructional field where there have been many different operators assigned to handle the equipment. Permanent prelubrication will be a significant factor in the reduction of service cost and maintenance expense on the part of these 16mm. users ... our congratulations to the Eastman Kodak Company for this outstanding achievement! ..."

Harold Guzofsky, *Manager*
Colorado Visual Aids Supply Co., Denver, Col.

"... Our Service Department records show that most mechanical failures in motion-picture projectors are caused by improper oiling ... the Pageant's permanent prelubrication definitely eliminates this annoying problem ..."

John T. Moore
Moore's Motion Picture Service, Portland, Ore.

Send this coupon today:

MOTION PICTURES
...teach, train, entertain

193

EASTMAN KODAK COMPANY, Rochester 4, N. Y.

Please send me the name and address of my nearby Kodak Audio-Visual Dealer ... also complete information on the Kodascope Pageant Sound Projector.

NAME_____

ORGANIZATION_____

ADDRESS_____

CITY_____ (ZONE) STATE_____

Kodak

NEWS NOTES

(Continued from page 21A)

economics, industrial arts, and photography. The catalogue also has sections on audio-visual aids, lighting the school plant, technical publications, Westinghouse scholarships available to students and teachers, and information on the "Company's Five-Year Replacement Plan" on appliances in home-economics laboratories.

Copies of this Teaching Aids Catalogue (B-5784) can be obtained by writing to the *School Service Department, Dept. T-359, Westinghouse Electric Corporation, P.O. Box 2278, Pittsburgh 30, Pa.*

♦ Participation by America's young craftsmen in Ford Motor Company's national 1952 Industrial Arts Awards competition increased 115 per cent over 1951.

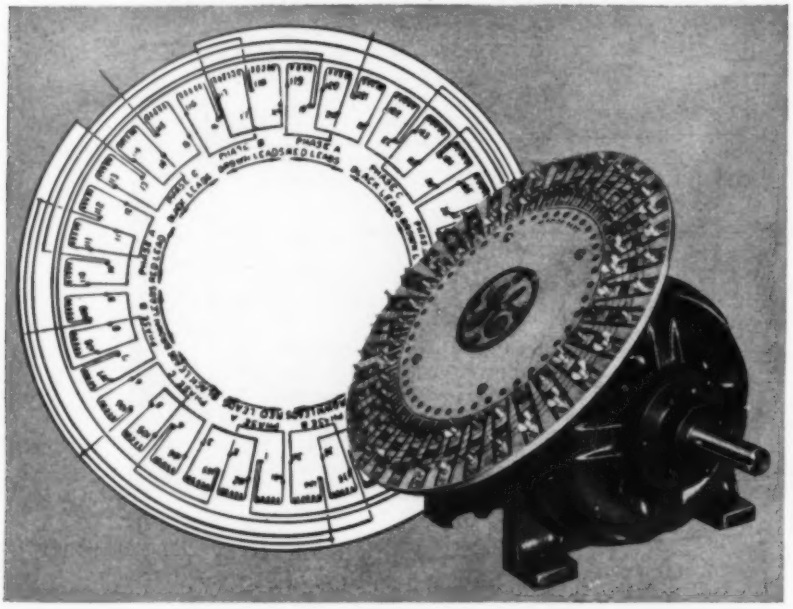
Junior and senior high school students sent more than 5100 entries this year for judging in July at the Henry Ford Museum in Greenfield Village, Dearborn, Mich. Last year entries totaled 2365. This year every state was represented, along with three U. S. territories.

California had 977 entries and won 279 awards. Pennsylvania had 574 entries and won 109 prize awards. Illinois had 516 entries and won 155 prize awards. Fourth place was won by Ohio, with 397 entries, and took 115 awards. Michigan contributed 326 entries for 96 awards; New York had 290 entries for 76 awards; and New Jersey had 261 entries for 49 awards.

Other states sending more than 100 entries were Missouri, 161 for 47 awards; Connecticut, 127 for 27 awards; Arizona, 126 for 22 awards; Texas, 109 for 33 awards; and Indiana, 105 for 32 awards.

Ford gave a total of $45,000 in prizes for the 1952 I.A.A. program.

The I.A.A. program manager is Dewey F. Barich, former faculty member of Kent State University, Kent, Ohio.



Theory and application combined

Study of induction-motor circuits speeded with G-E 72-Terminal Induction Motor

OVER 20 RATINGS are possible with the G-E 72-Terminal Induction Motor. Designed so the student can get actual practice in selecting circuits for combinations of phase and speed, with this equipment the student can test various combinations for comparative torque, hp output, efficiency, power factor, and other characteristics.

TEN MOTORS IN ONE is actually what the student has at his disposal as the motor can be wired for ten different combinations of phase, voltage, and number of poles.

For more information about how the G-E 72-Terminal Induction Motor can help you introduce induction-motor design and connection contact your nearest G-E Apparatus Sales Office, or write for Bulletin GEC-659 to General Electric Co., Section 687-108, Schenectady 5, N. Y.

YOUR COPY of this 16-page bulletin, GEA-5526, containing information on the specially designed G-E Educational Equipment for electrical laboratories is available on request.

GENERAL ELECTRIC

New Publications

Basic Lessons in Printing Layout

By R. Randolph Karch. Paper cover, spiral binding, 140 pp., 6 by 9 in., illus., $1.96. The Bruce Publishing Co., 400 North Broadway, Milwaukee 1, Wis.

An excellent text on the important subject of printing layout written by a man who has had a great deal of practical as well as teaching experience in the field of printing. This text gives the student clear and concise information about typographic design, display composition, correct spacing, and copyfitting.

It also contains approximately 290 student assignments.

Studying Students — Guidance Methods of Individual Analysis

By Clifford P. Froehlich and John G. Darley. Cloth, 411 pp., 5⅝ by 8½ in., $4.25. Science Research Associates, Inc., Chicago, Ill.

A textbook for guidance workers which explains useful techniques on how to study individuals and use the findings effectively.

The 18 chapters of the book discuss what must be known about students, how to summarize the results of tests, statistical methods of analyzing test scores, how to observe and interview students, guidance testing, measuring scholastic ability and achievement, appraising personal adjustment, determining aptitudes, and identifying student problems.

Mechanics — Part I — Statics Part II — Dynamics

By J. L. Meriam. Part I, cloth, 340 pp., 6 by 9¼ in., illus., $4. Part II, cloth, 330 pp., 6 by 9¼ in., illus., $4. John Wiley & Sons, Inc., New York, N. Y.

An excellent set of engineering texts in which physics, mathematics, statics, and dynamics are skillfully integrated. Emphasis is placed at all times on the thorough understanding of principles and for that reason, both volumes of this treatise on mechanics contains hundreds of practical, up-to-date problems to the solution of which these principles can be applied.

The problems, too, are excellently and profusely illustrated. The two volumes carry over 1000 such illustrations.

Incentive Management

By James F. Lincoln. Cloth, 280 pp., 6⅛ by 9¼ in., $1 in U.S.A., $1.50 elsewhere. The Lincoln Electric Co., Cleveland, Ohio.

A very timely book in this era of unrest, when most individuals refuse to accept responsibility, when freedom is sacrificed for security, when many ask for higher incomes but refuse to do more work to make these incomes possible.

The author who is the executive head of a

(Continued on page 26A)

Can you find the 15 power tools in this picture?

THIS PICTURE illustrates an important new concept in industrial arts training. It's the *Flexible Shop*. It's based on the flexibility inherent in SHOPSMITH, Magna Engineering's multi-purpose power tool.

In the *Flexible Shop*, flexible work stations supplement or take the place of individual power tools. Each of the three SHOPSMITHS pictured above is actually five tools—8″ circular saw, 12″ disc sander, 33″ wood lathe, 15″ vertical drill press and horizontal drill. Each can be changed to fit the needs of the class or the teaching techniques of the instructor.

The advantages are apparent and impressive: faster indoctrination in the safe and proper use of each tool (since all SHOPSMITHS can be set up alike), fewer tie-ups (since SHOPSMITHS can be changed to relieve the pressure on one type of tool), 50% saving in space (SHOPSMITH requires a working area of 48 sq. ft. compared to 104 sq. ft. for five separate tools) and fewer budget restrictions (SHOPSMITH costs $189.50 less motor, $232.45 with motor and special school guards).

In each of its five basic positions, SHOPSMITH is a different, basic, single-purpose tool—a tool that will equal or exceed the performance of the tool it replaces. Operation is standard. Quality is well above standard — heavy, fine grain castings; ball-bearing spindle, tolerances found only in the finest tools. Write for results of educators' research on the *Flexible Shop* and detailed SHOPSMITH specifications.

Magna Engineering Corp.

Dept. 231-U *at factory nearest you*
12819 Coit Road, Cleveland 8, Ohio, OR Menlo Park, California

• Please send me complete information about the *Flexible Shop* and the application of SHOPSMITH to industrial arts education.

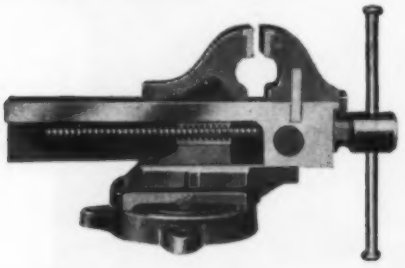
NAME _____ POSITION _____

SCHOOL _____

ADDRESS _____

CITY _____ STATE _____

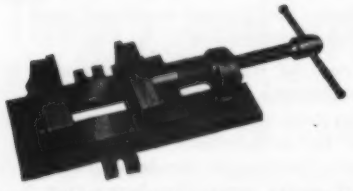
ONLY DESMOND-SIMPLEX HAS ALL THESE FEATURES AT NO EXTRA COST



1. All steel slide gives greater capacity; guaranteed not to fail.
2. Steel screw, fully enclosed, protected.
3. Stands heaviest blows; jaw inserts fit on shoulder; screw take no shock.
4. Easier lubrication due to outside retainer.
5. Full 360° swivel; positive locking base.
6. Minimum backlash; longer, stronger vise nut last indefinitely.
7. One-piece handle, non-pinching type.

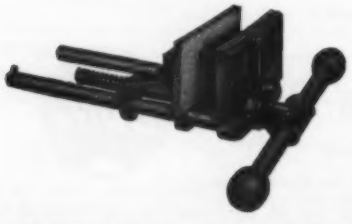
MANY COMPANIES STANDARDIZE ON DESMOND-SIMPLEX

. . . and because they are *best values* for industry, they are *best buys* for schools and vocational shops. Why get less than Desmond-Simplex quality when you pay no more? Complete line supplied through leading industrial distributors.



Above: Rugged drill press and milling machine vise.

Below: Popular economy model continuous screw woodworker's vise.



DESMOND-SIMPLEX

STEEL SLIDE VISES

The Desmond-Stephan Mfg. Co. Urbana, Ohio

NEW PUBLICATIONS

(Continued from page 24A)

large industrial firm, discusses the new industrial age, the development of personnel, the driving force of incentive, incentive systems, security, the value of competition, the error of restriction of skill, the value of employer and employee cooperation, and how to finance an industrial organization by bridging the gulf between worker and management by combined ownership.

UHF Practices and Principles

By Allen Lytel. Cloth, 390 pp., 5½ by 8½ in., illus., $6.60. John F. Rider Publisher, Inc., New York, N. Y.

A fine text for the student and worker in the field of electronics. The 11 chapters of the book discuss ultra-high frequencies, electromagnetic radio waves, antennas, transmission lines and wave guides, tuned circuits, oscillator tubes and circuits, receivers and converters, transmitters, vacuum tubes, and test equipment and techniques.

The appendix of the book contains some useful tables and charts, and quite a comprehensive bibliography.

General Mathematics at Work

By Claude H. Ewing and Walter Wilson Hart. Cloth, 266 pp., 6⅛ by 9 in., illus., $2.80. D. C. Heath and Co., New York, N. Y.

Starting with a review of common arithmetic, including whole numbers, fractions, and decimals, this text takes the student through practical geometry, practical algebra, and practical trigonometry.

It is a one-year course which gives a fine groundwork of mathematics to the future worker in industry.

How to Recognize Type Faces

By R. Randolph Karch. Cloth, 268 pp., 5½ by 8½ in., illus., $6. McKnight & McKnight Publishing Co., Bloomington, Ill.

A one-volume type-face book which contains all the type faces (1475 of them) now sold in fonts or matrix form in the United States.

This handy book takes the place of many type catalogs. It should be of great interest to the student of printing in the school, as well as the journeyman printer in industry.

All About Television

By John Derby. Cloth, 171 pp., 6⅝ by 9½ in., illus., $3. Popular Mechanics Press, Chicago, Ill.

A handbook written so that the average reader can understand the underlying principles of television and at the same time learn how he can maintain his set so as to have good reception without paying exorbitant service charges.

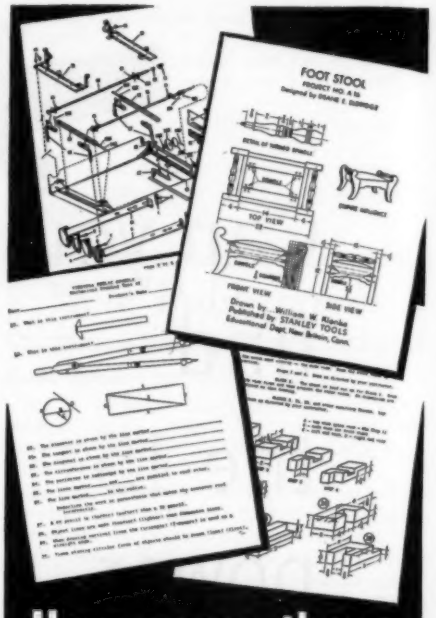
The book is profusely illustrated, and most readers will be delighted with it.

An Approach to Type

By John R. Biggs. Cloth, 152 pp., 7½ by 9⅞ in., illus., $4.75. Pellegrini & Cudahy, New York, N. Y.

A text on typography for the graphic-arts student. The book describes the historical, practical, and technical facts about type so that the student can acquire a good groundwork for his future work.

A bibliography of books on typography and a glossary of printers and typesetters' terms also are included.



How were these teaching aids made?

Forget paper limitations. You can now have sharp, clear, black-on-white copies of detailed drawings on almost every kind of paper and card stock—and duplicated on both sides of the paper if you wish.

Mimeographing has a new versatility that lets you produce project work sheets, tests, and other teaching aids to fit your individual requirements—and these copies can be made in sizes ranging from 3 x 5 to 9 x 16 inches.

A. B. Dick mimeograph products are for use with all makes of suitable stencil duplicating products. For more information, send the coupon below.

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Without obligation, send me full information about the MODERN mimeograph ☐, precision stencil drawing instruments ☐, revolutionary new Contac-Dri ink ☐.

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3 "Musts" for elementary school shops:

1. SCROLL SAW 2. BENCH GRINDER 3. DRILL PRESS

—DELTA, of course

Basic tools that belong in every well planned elementary school shop are the scroll saw, bench grinder and drill press—basic because of the extraordinary number of useful operations they perform.

Basic, too, is the overwhelming preference of America's teachers for Delta tools—preference for their versatility, dependable accuracy, durability, economy and outstanding safety.

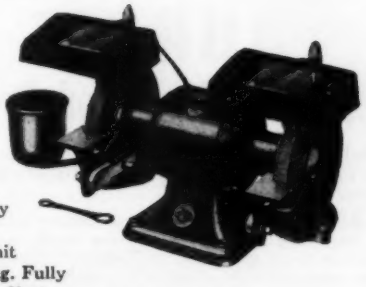
DELTA 24" SCROLL SAW

Using all types of blades, the Delta 24" scroll saw operates smoothly and freely. The blade is properly guided to reduce blade breakage.

Heavy cast table tilts to the right and left; by rotating the table bracket 90° and rotating chuck, the blade can cut in 2 directions; the table can also be tilted to the front —permitting stock of any length to be cut.

Available in variable speed model for any speed from 650 to 1700 cutting strokes per minute, and a standard four-speed model.

DELTA BENCH GRINDER



The Delta is the tool grinder "that cannot forget its goggles"—patented twin-lite safety shields with double thickness shatter-proof glass.

Wheels are absolutely true and vibrationless to permit accurate tool grinding. Fully machined tool rests adjust vertically and angularly. Wheel guards are heavy cast iron with steel side plates—only actual grinding section is exposed.

DELTA 14" DRILL PRESS

Only the Delta has all the best features of other standard drill presses and the additional advantages of "plus values"—*self-aligning drive; free-floating interchangeable spindles; sturdy quill design and construction; sealed, lubricated-for-life ball bearings; ease of operation and outstanding safety features.*

In addition to drilling, the Delta drill press performs many operations—sanding, routing, shaping, mortising, and tapping are just a few.

DELTA POWER TOOLS Another ROCKWELL Product

There's a Delta Power Tool for Every Job-

WOOD OR METAL WORKING

53 MACHINES • 246 MODELS

MORE THAN 1300 ACCESSORIES

Delta School Shop Contest winners will be announced at A. V. A. Convention. Winning entries will be on display at Booths 57, 58 and 59.

DELTA MILWAUKEE

DELTA POWER TOOL DIVISION

Rockwell MANUFACTURING COMPANY

402M N. Lexington Avenue • Pittsburgh 8, Pennsylvania

- ☐ Send me the latest Delta catalog.
- ☐ Send me the name of the nearest Delta dealer.
- ☐ Send me "The Power Tool Instructor."

Name_____

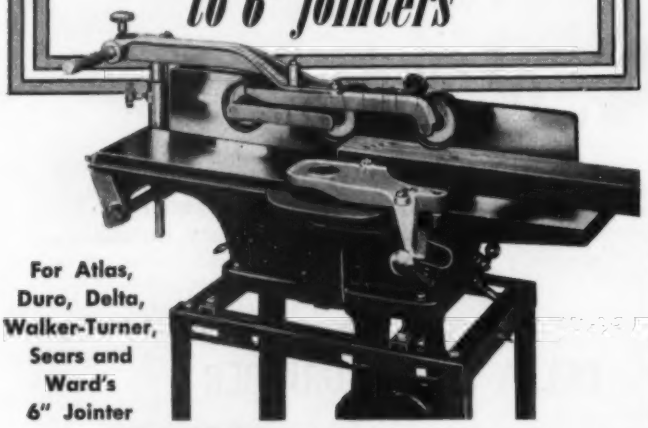
Position_____

School_____

Address_____

City_____ Zone_____ State_____

NEW invention brings added speed, accuracy and safety to 6" jointers



For Atlas, Duro, Delta, Walker-Turner, Sears and Ward's 6" Jointer

DURO'S new Safety Hold-down and Pressure Guard

Duro introduces completely new Jointer accessories which greatly reduce personal injury hazard — and make operation faster, easier and more accurate.

"Hold-down" has rubber covered rollers which guide the stock, so hands are kept away from cutter head. Automatically maintains continuous, even pressure and guides stock toward fence — so that even warped or twisted lumber is planed perfectly flat and smooth. Swings out of way instantly when not needed.

"Pressure Guard" provides side pressure at table level when edge jointing stock. This insures a true edge.

Write for special circular **giving prices, specifications and full details.**

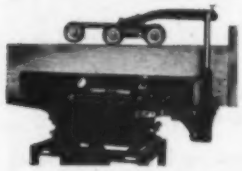


FIG. 1 — Showing 8½" vertical capacity of Hold-down

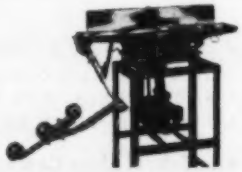
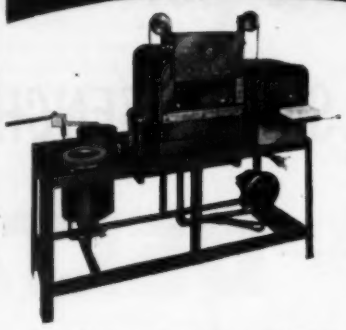


FIG. 2 — Note how easily "Hold-down" can be swung out of position.

DURO METAL PRODUCTS CO.
2666 NORTH KILDARE AVENUE
CHICAGO 39, ILLINOIS
Makers of Nationally Advertised Duro-Chrome Hand Tools

DURO METAL PRODUCTS COMPANY
2666 N. Kildare Ave., Chicago 39, Illinois
Gentlemen:
Please send me full details on the new Duro "Hold-Down" and "Pressure Guard" — also catalog showing complete line of DURO Tools.
Name
Address
City Zone State

EASY FAST



BROADEN the scope of classroom work with the JOHNSON TRIPLE TREAT

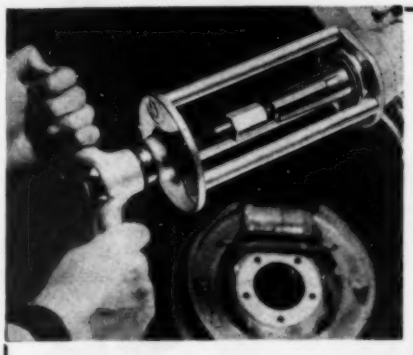
Three furnaces in one compact unit for teaching a wide range of heat-treating techniques. Requires only 24" x 64" floor space. The Johnson Triple Treat incorporates a pot furnace for lead, salt and cyanide hardening (pot size 6" dia. x 8" deep); a Quick Acting Johnson Hi-Speed steel furnace with temperature range of 1400° to 2350° F. for fast, economical heat treating any steels, tools, dies and small metal parts (firebox 7" x 13" x 16½"); and an atmospheric fired tempering furnace with a temperature range of 200° to 1100 F. for pre-heating, tempering and drawing (firebox 5" x 7¾" x 13½"). Complete as illustrated with sturdy steel bench and Johnson Blowers.

$539.00 F.O.B. Factory

Individual units in Triple Treat are also available separately. Write for full information.

FREE CATALOG

JOHNSON GAS APPLIANCE CO.
585 E AVENUE N.W. CEDAR RAPIDS, IOWA



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All the latest developments... in book form for the first time

EXPLORING AUTOMECHANICS
By HAROLD T. GLENN

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SHOP EQUIPMENT NEWS

STANLEY'S 100ED POWER BIT

Stanley Tools is now marketing a new Russell Jennings power bit. This 100ED power bit with the "50-50" Brad-Screw Point has been designed for fully controlled power drilling in any three-jawed chuck. It produces clean-cut holes, faster and easier, in soft or hard wood, giving the operator full control at all times. The "50-50" can be started and stopped at any time, at any depth, without jamming or binding even when used with lightweight ¼-in. drills. Brad and screw-type points are combined in a specially pitched single-thread point. On one side, the thread, properly pitched, quickly pulls the bit into the wood without binding and stopping even the lower-powered drills. On the other side, the interrupted thread, like a brad point, allows the operator to release the bit instantly from the wood by a slight pullback on the drill. A single shortened spur, instead of the conventional two, helps balance the cutting action.

100ED Power Bit

The new bits are Russell Jennings quality, made of high carbon steel, tempered for lasting edges, with hand-filed extension lips and spurs for keen cutting.

The 100ED Power Bit with the "50-50" Brad-Screw Point is available in open stock and in two plastic roll kits — one with five different bit sizes, the other with eight.

For further information write to *Stanley Tools, Educational Dept., 104 Elm St., New Britain, Conn.*

For brief reference use IAVE – 0901.

"CRAFTOOL" FOR GENERAL CERAMIC WORK

Craftools, Inc., of New York City, announces the introduction of the new "Craftool" — a variable speed electric potter's wheel, which embodies many features to make the unit almost a complete ceramic shop.

Craftool, while basically a potter's wheel, when augmented with the addition of a few accessories, becomes a belt sander, disk sander, drill, ball mill, air compressor, grinder, and flexible shaft.

It has one constant and two variable speed shafts which give the user a range of 40–1800 r.p.m. The speeds are regulated by a foot and/or lock-hand control.

(Continued on next page)

Craftool for Ceramic Work

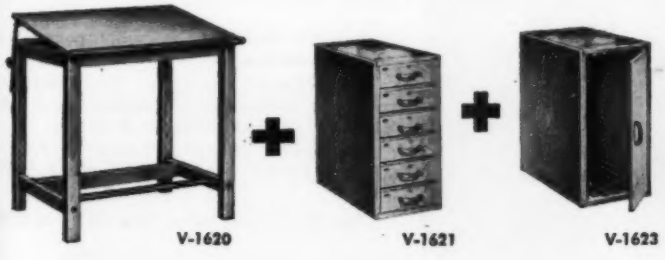
Too many drafting students and not enough room?

Hamilton has the answer!

HERE'S HOW IT WORKS—This simple, sturdy, good-looking Student Drafting Table Assembly is composed of three units, giving it real space-saving flexibility. The Assembly consists of the table (V-1620), the tool drawer unit (V-1621) and the board storage unit (V-1623). Storage units can be arranged to make maximum use of floor space.

FOR EXAMPLE—An entire aisle can be eliminated by placing two rows of tables together. The left-hand row would have the tool drawer unit at right-front and the board storage unit at left-rear, opening to the left-hand aisle (as illustrated). Storage unit arrangement in the right-hand row would be reversed.

This Student Drafting Table Assembly is solidly built of Northern Wisconsin Birch, finished in Golden Brown. Find out for yourself about Hamilton's traditional quality and efficient work-design. You'll be amazed at how little it costs . . . see your Hamilton Dealer now . . . or write us for full details.



V-1620 V-1621 V-1623

Hamilton

MANUFACTURING COMPANY
Two Rivers, Wisconsin

SHOP EQUIPMENT NEWS

(Continued from previous page)

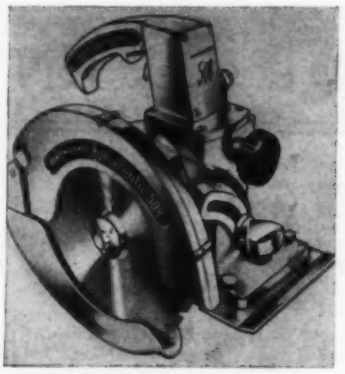
The machine, though portable and small enough to fit into a closet, has a great deal of capacity. It is specially designed for schools, camps, hospitals, shops, professionals, and hobbyists.

A complete catalog may be obtained by writing to *Craftools, Inc., 401 Broadway, New York 13, N. Y.*

For brief reference use IAVE — 0902.

NEW SPEEDMATIC SAWS

The Porter-Cable Machine Company, has developed two new Speedmatic models which feature a Kickproof Clutch. When the blade binds in a cut or strikes a knot, this Kickproof or friction clutch allows the motor to turn while the blade remains stationary. This eliminates all possibility of dangerous kick back, and not only protects the operator, but also prevents damage to the gears and the work, and reduces motor burnout.



Porter-Cable 8-in. Speedmatic Saw

These new Speedmatic Saws also are equipped with an instant depth adjustment which can be set accurately in a few seconds. The saw moves up and down on dovetail ways which are precision machined to maintain accuracy of cut at any depth.

These Porter-Cable saws are also equipped with an improved safety guard which covers more blade and tooth area, and which will not jam with chips or wet sawdust. Blade changes can be made quickly since it is not necessary to remove the new Safety Guard for this operation.

Model 507, with 7½-in. blade, cuts from 0 to 2½ in. maximum at 90 degrees and from 0 to 1 27/32 in. at 45 degrees. The over-all size of Model 507 is 11¾ by 8⅜ by 10½ in., and it weighs only 15 pounds.

Model 508, with an 8-in. blade, cuts from 0 to 2¾ in. at 90 degrees and from 1/32 in. to 2 in. at 45 degrees. The over-all size of Model 508 is 12 by 8⅜ by 11½ in., and its net weight is 17 pounds.

For further information address correspondence to *Porter-Cable Machine Company, Dept. PR-5, Syracuse 8, N. Y.*

For brief reference use IAVE — 0903.

NEW COMBINATION TOOL SET

John H. Graham & Co., Inc., New York City, is introducing a new combination tool set. This new combination consists of six of the most popular sizes of Acrabore auger bits, ¼, 3/16, ⅜, 5/16, ½, and 1 in., and the three most used Witherby woodchuck chisels, ½, ¾, and 1 in., in an attractive cherry wood case.

New Combination Tool Set

Acrabore auger bits are fully polished and precision machined to close tolerances.

The Witherby woodchuck chisel features a blade of special analysis crucible steel, which takes and holds an extremely keen edge.

For further information write to *John H. Graham and Co., Inc., 105 Duane St., New York 8, N. Y.*

For brief reference use IAVE — 0904.

(Continued on page 34A)

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. . . quality lumber to meet the highest standards of modern school shops

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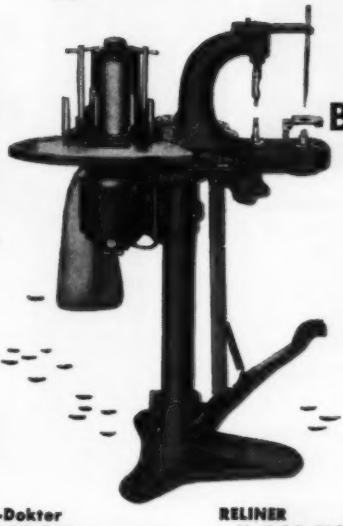
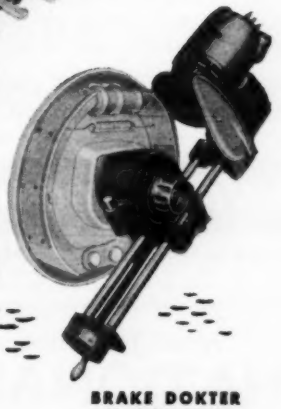
DRUM-Dokter
Model B-500



RELINER
Model B-51C

MINIT BONDER
AND DE-BONDER
Model B-600B

BOND-TEST-R
Model B-610



BRAKE DOKTER
Model B-115A

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Schools equipped with a complete Barrett Brake Department qualify for the following training material:

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Take advantage of the opportunity to receive this complete training course—everything necessary for thorough instruction. The manual contains easy-to-understand instruction, plus all essential illustrations—proven by regular use in the Barrett Brake School and in leading vocational schools throughout the country.

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Model 610 cuts 6" round and 6" x 10" flat. Coolant equipment available.

That's why the Kalamazoo, so popular in industry, is used by so many schools.

Accuracy of a few thousandths is easy to maintain, whether cutting bars, rounds, angles or odd shapes. There's minimum kerf . . . no burr. What's more, the Kalamazoo is *safe* to use. Saw blade is almost completely enclosed . . . no exposed pulleys or gears.

Three sizes available. Each can be had with casters for complete portability. Send for full details *now*.

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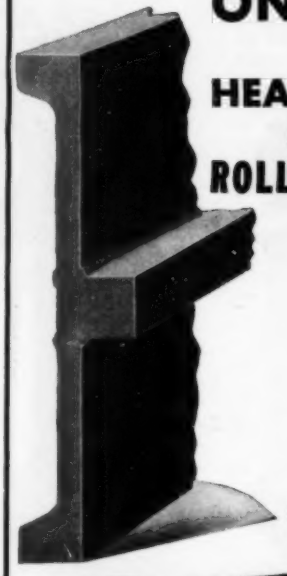

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Model TMU — Only 44 in. High, 15,000-lb. or 30,000-lb. Capacity

Ease of operation makes National Forge Universal Testing Machines ideal for school instruction tests of a great variety of materials and specimen sizes. Compact, rugged, dependable. A.S.T.M. accuracy. Three scale ranges on each machine give widespread utility. Controls are simplified, with safety cutouts. Infinitely-variable speed. Moderate in price.

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WEBER DRAWING MATERIALS
for Mechanical Drawing Classes

For precision student work make WEBER – COSMOS DRAWING INSTRUMENTS (Original Round System) the heart of your equipment. Use WEBER – COSMOS INSTRUMENTS with the other Weber drawing necessities, including T Squares, Triangles, Curves, Scales, Slide Rules, Drawing Boards, and Waterproof Drawing Inks for top performance at school budget prices.

Weber – Cosmos Drawing Instruments are available in sets, and separate pieces; also a full line of replacement parts. Superb in workmanship and materials.

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We can offer immediate delivery on sturdily constructed, single and double type Sjöström Work Benches. For construction details, specifications and dimensions, write for our Work Bench Data Sheet which describes all available types.

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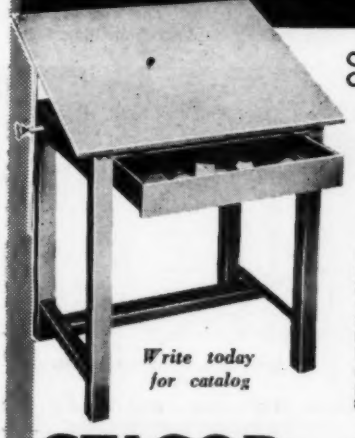
4-POST DRAWING TABLE



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By M. J. Ruley. Contains thirty-five projects, all easy to make with ordinary shop equipment. A photograph, bill of material, procedure and suggested reading references are included with the presentation of each project. Includes: Bottle openers, paper knife, small hammer, turner, towel rack, hose holder, garden trowel, jar opener, paper weight, scoop, match box, spice rack, tooth brush holder, dust pan, memo pad holder, picture frame, weeder, toasting fork, door knocker, flower pot holder, pin-up lamp, house marker, door grill, coping saw frame, soldering copper, and others. 80 pages, cloth cover. $2.00

"PROJECTS IN ELECTRICITY"

By Merle D. Collings. Twenty-one inexpensive projects which demonstrate many basic electrical principles. Simplified construction through use of drawings and step-by-step instructions. Projects selected which arouse greatest student interest. No elaborate equipment or tools necessary. Photos of each completed project included. 80 pages. $1.20

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By Douglass & Roberts. Detailed drawings for 109 projects with range of difficulty from simple bookends to complete suites of furniture. Construction suggestions and bills of materials included for the more complex items. Photos show completed projects. Includes: Bird houses, game boards, shelves, cupboards, tables, etc. $3.75

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By Roy E. Knight. Twenty-five usable projects give practice in most machine tool operations. Includes blueprint, bill of material and operation time sheet with each project. Hammers, depth gauge, parallel clamp, angle plate, ring gauge, mandrel, crotch center lathe centers, drill press vise and many other projects. 112 pages. $1.20

"107 LEATHERCRAFT DESIGNS"

By John W. Dean. These are 107 full size designs for the projects included in *Leathercraft Techniques & Designs.* Size and proportion of most can be changed without affecting their beauty. Consists of 50 sheets in attractive binder. $2.00

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"CARVING ANIMAL CARICATURES"

By Elma Waltner. A practical presentation of techniques of wood carving, devoted mainly to animal caricatures. Contains 23 interesting objects with specific instructions for carving and finishing each. $1.50

"28 TABLE LAMP PROJECTS"

By H. A. Menke. 28 projects for both modern and traditional lamps. Presentation of each project includes photograph of completed lamps, working drawing, and outline procedure for making lamp.
In Process

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NEW TECH BOOKS TO FILL TRAINING NEEDS

Automobile styles change to whet the car-owner's appetite for the "latest." Clothing fashions are born so that consumption will outrace the normal life of fabrics. But Tech Books appear for just one reason — *to meet an existing need for those books.* Where an up-to-date, satisfactory text is available, American Tech does not crowd the field with another. But when such texts are not available to schools, *we fill the gap.*

12 NEW BOOKS

Listed below are 12 Tech books published in the last year. Each is designed to plug a gap in industrial or vocational education. If you have been looking for a text on these subjects, write in for an examination copy.

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AMERICAN TECHNICAL SOCIETY
Dept. W450
848 East Fifty-Eighth Street
Chicago 37, Illinois

SHOP EQUIPMENT NEWS

(Continued from page 30A)

A NEW LUFKIN STEEL TAPE

The new Lufkin "Royal" Ni-Clad steel tape has figures and graduations that won't wear off, as they are an integral part of the steel. The hard nickel-plated surface makes the tough and durable tape rust and corrosion resistant. A hook ring is furnished on this tape at no extra charge.

New Lufkin Steel Tape

The durable black markings are easy to read, as they stand out sharp and clear against the bright nickel background. The tape is also easy to read because the now famous Lufkin "Instantaneous" markings (last preceding foot number repeated each inch) are used on it.

The rust-resistant, welded, metal case liner is covered with tough dark green vinyl. Folding flush handle opens with push pin.

For a circular describing the "Royal" Ni-Clad write to *The Lufkin Rule Co., Saginaw, Mich.*

For brief reference use IAVE — 0905.

HOTPACK LIMITOR

Designed to turn off the current of electric kilns at a predetermined time, in case the operator forgets.

Can be easily set for intervals up to 12 hours and is cheap insurance against loss of heating elements, and pieces that may be ruined because of overfiring, due to forgetfulness.

Hotpack Limitor

Two sizes are available, one is a portable plug-in unit for 115-volt, 15 amperes, 60-cycle current, and the other is for connected load of 220-volt, 30 amperes, 60-cycle current.

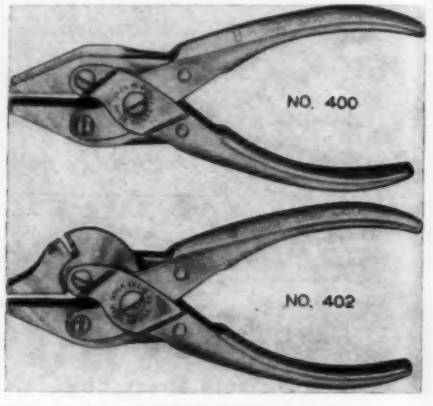
For further information write to *Electric Hotpack Co., Inc., 5067 Cottman Ave., Philadelphia 35, Pa.*

For brief reference use IAVE — 0906.

NEW PARALLEL JAW PLIERS

Utica Drop Forge and Tool Corporation have added two new compound-leverage, parallel-action pliers to their line.

Designated as No. 402–6½ (with cutter) and No. 400–6½ (without cutter), these two numbers will provide the Utica line with the ideal type of pliers for jobs requiring parallel jaws and extremely high mechanical advantage.



Utica Pliers

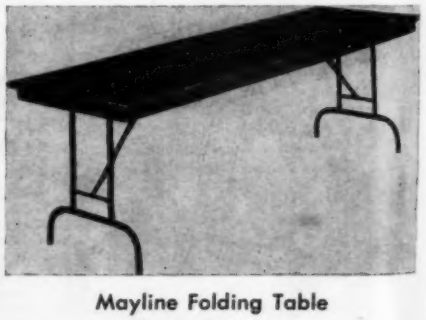
All parts of these pliers are made by Utica in their plant at Clinton, N. Y.

For further information about these pliers write to *Utica Drop Forge and Tool Corp., Utica 4, N. Y.*

For brief reference use IAVE — 0907.

THE MAYLINE FOLDING TABLE

Mayline has added to its line a serviceable folding table, reasonably priced. The top is of everlasting composition board attached to a 7-ply ¾-in. thick plywood frame encased in a solid hardwood frame. The edges of the top are protected by hardwood molding.



Mayline Folding Table

Strong, steel tubing forms the legs to which are attached rubber cushioned steel glides. The legs fold as a unit and nest into the underside of the table. These leg units are of all welded construction to assure firmness and rigidity. The

(Continued on page 36A)

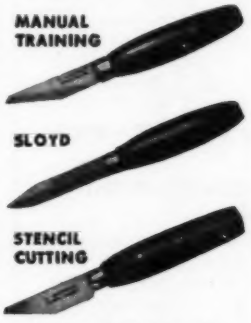
They'll do a better job . . .

R. MURPHY
"Stay Sharp" Knives

Special designs!

KEEN, hand-honed blades of the finest tempered steel . . . hardened by an exclusive process . . . hold their edge longer — cut cleanly, easily.

"Proper Grip" handles are designed especially for each cutting job. That's why more and more instructors insist on Murphy *Stay Sharp* Knives . . . why *your* students will prefer them, too!



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the easy-to-use Soldering Flux for neat strong unions.

Use Rubyfluid Flux — liquid or paste — to get neat, strong unions speedily and easily. Rubyfluid is a special fast acting formula, wets out freely, is free from harmful and objectional fumes, economical to use. Try it — send $1 for special offer — 1 pt. liquid, ½ lb. paste flux and helpful booklet.

For Stainless Steel use *Ruby's Stainless Steel Flux*, perfected for that metal.

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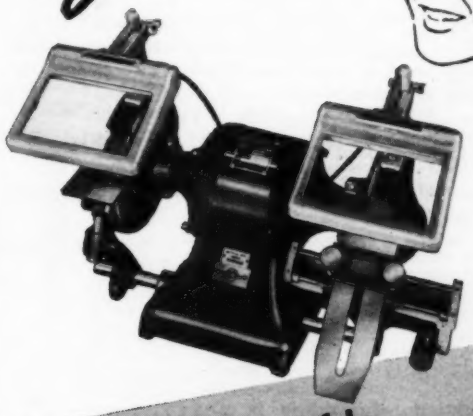

Sharpen Tools Safely
STANLEY No. 677 BENCH GRINDER

Here's the answer to safe tool sharpening—for your students *and* your edge tools.

The Stanley No. 677 Bench Grinder operates at only 1725 r.p.m.—protects your tempered tools from over-heating. Patented Plane Iron and Chisel Attachment permits precise, uniform feeding of the tool to the wheel—even unskilled operators grind a straight, clean edge with the first pass across the wheel.

"Flud-Lite" Eye Shields—connected with grinder switch—throw bright light directly on grinding wheel and work. *Cannot be swung out of position.* They combine the finest possible lighting and eye protection. Also available for grinders now in your shop.

Don't wait for an eye accident before ordering this *safe* Stanley Tool grinder . . . it's priced well within your school budget. Write today for Catalog.

NEW Series 160 Drills — New power, new styling. Available with "D" shaped or drop handle, capacities ¼", (standard or heavy duty), 5/16", and ⅜".

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Gentlemen: Please send me your complete catalog No. 96 on Stanley Electric Tools.

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SHOP EQUIPMENT NEWS

(Continued from page 34A)

support brace which holds the legs in place when the table is set up has a spring type, self-locking, lever release brace lock. The shape of the legs has been so designed that the table will not tip sideways when weight is placed on any edge.

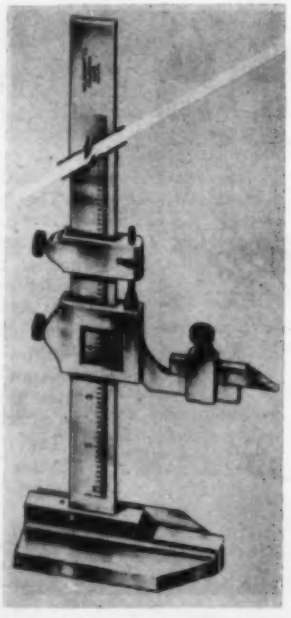
The table comes in two top sizes, 36 by 72 in., and 36 by 96 in. The table height is 30½ in. Frame and trim are finished in oak. The legs are finished in an attractive brown color.

Complete information on delivery and prices can be obtained by writing to *Engineering Manufacturing Company, 619 North Commerce St., Sheboygan, Wis.*

For brief reference use IAVE — 0908.

NEW STARRETT VERNIER HEIGHT GAGE

The L. S. Starrett Company has announced the addition of a new 12-in. gauge to their line of No. 454 Vernier Height Gauges. Toolmakers, inspectors, and layout men will find this new gauge especially useful because the bar has a 13-in. scale which permits taking accurate measurements over a full 12-in. range in thousandths of an inch.



No. 454 Vernier Height Gauge

This gauge is made of fine steel with a ground finish on all surfaces. The bottom of the base and the scriber are hardened and lapped and the bar is hardened. The scriber is easily removable for sharpening or for substituting attachments or a dial indicator. The Vernier plate is adjustable to maintain the zero point in the event of wear.

For further information write to *The L. S. Starrett Co., Athol, Mass.*

For brief reference use IAVE — 0909.

(Continued on page 38A)

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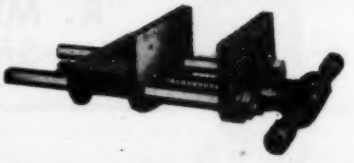

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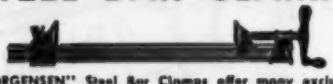

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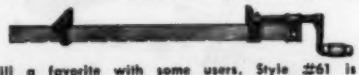

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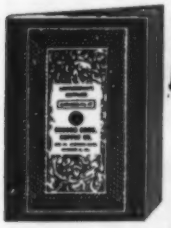

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SHOP EQUIPMENT NEWS

(Continued from page 36A)

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The kit includes a complete set of drawing instruments, protractor, architect's scale, engineer's scale, 8-in. triangle, 10-in. triangle, French curve, draftsman's tape, pencil pointer, two drawing pencils, and two erasers. Two large inner compartments provide carrying space for drawing paper and notepaper.

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The kit is also adapted to the use of students in technical schools, vocational schools, and colleges, depending on the particular selection of drawing instruments. Information on drawing sets available and on prices of complete kits may be obtained from *Berger Scientific Supplies, Inc., 342 Madison Ave., New York 17, N. Y.*

For brief reference use IAVE — 0910.

NEW CHART ON PLIERS AND WRENCHES

Utica Drop Forge & Tool Corporation is offering, without charge, a newly prepared comparative chart of pliers and adjustable wrenches. It is a carefully compiled table which cross-refers and compares the numbers of 31 manufacturers of pliers and wrenches.

Some 144 pliers and adjustable wrenches are listed. Shown opposite it, for quick reference, are the brand names and tool numbers of other suppliers of similar items. The list is the result of a careful study of the latest available catalogs.

Also included is a pictorial diagram, the "Family Tree of Common Pliers" which shows the logical groupings of pliers by design characteristics.

Other wall charts obtainable from this firm are "How to Use Pliers," and "Why Drop Forged Tools Last Longer." Both of these wall charts are 32 by 12 in. in size, and they are printed in two colors.

(Continued on page 40A)

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SHOP EQUIPMENT NEWS

(Continued from page 38A)

Besides these wall charts, the firm has published the following booklets.

"First Aid for Pliers," an 8-page booklet which describes how to cure the five most common ailments from which pliers suffer.

"First Aid for Adjustable Wrenches," a 4-page booklet which describes how to put and keep wrenches in good repair.

For those who would like to get Utica's training aids in one package, there is the "Tool User's Guide."

The firm also has available two Utica movies. The first one, "Add Power to Your Hands," pictures how modern hand tools are manufactured. The second, "Pliers — Their Care and Use," needs no further description.

All of the foregoing items may be obtained by writing to *Educational Dept., Utica Drop Forge and Tool Corp., Utica 4, N. Y.*, on a business letterhead.

For brief reference use IAVE — 0911.

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The Research Department of the Cincinnati Milling Machine Company has prepared a paper on "The Influence of Higher Rake Angles on Performance in Milling."

This firm also has published a revised edition of their booklet, "Cutting Gear Teeth on a Milling Machine."

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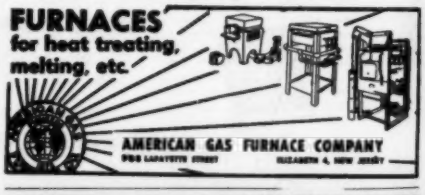

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INDUSTRIAL ARTS AND VOCATIONAL EDUCATION November, 1952

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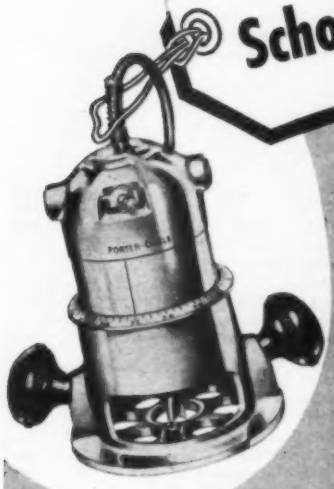

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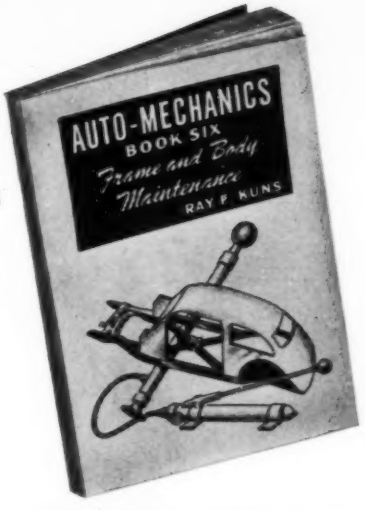

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Geared headstock—Power is transmitted efficiently at eight conveniently selected speeds.

Quick-change box—56 feeds and threads can be chosen simply through this foolproof mechanism.

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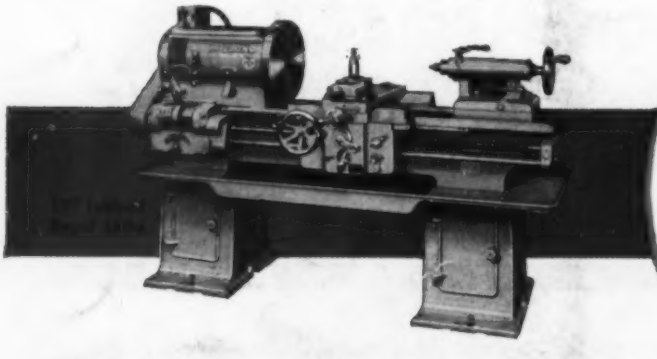

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